Boris Dmitriev

WHAT IS MOTION

Time worries – one, time worries – two!

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Mankind has learned to answer difficult questions. And to simple ones not so much.

Newton told us the speed at which an apple falls. Einstein clarified his answer. But why and exactly how an apple falls, we still don't know.

If we remember the flying/non-flying arrow from Zeno's aporia, then the question of what motion is is completely deadlocked.

However, Boris Dmitriev's book offers some answers. In particular,
The author considers time as a wave function, which fundamentally
of the world around us.

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1. PREFACE

The title of this book quite unambiguously reflects its main content and purpose. The reader will learn what motion is, how the author sees it, and how it is realized in the infinitely moving world around us as he becomes acquainted with this work. In the introductory remarks I would like to point out the most unexpected aspect of this theoretical study.

The creative search developed in such a way that in order to successfully solve the problems leading to an understanding of motion, the author needed, by necessity, to address the problem of the origin of the universe. All attempts to adapt the emerging picture of motion kinematics to the "Big Bang" theory, widely used by modern science, did not lead to positive results. The physical and philosophical facture did not allow this most widespread in science cosmological hypothesis to fill the fundamental categories of the universe — "matter", "space" and "time" — with such conceptually meaningful theoretical content, which would promote the construction of a universal theory of relative motion. An impeccable theory, devoid of internal contradictions and meeting the highest requirements.

The degree of our penetration into the mystery of motion depends very much on the quality of the conceptual status of the abovementioned fundamental categories. Because it is in the interaction between matter, space, and time that, according to the accepted scientific views, motion can actually take place. Outside of space, matter and time, the observability of movement of material objects relative to each other is beyond our speculative imagination.

After long and difficult deliberation, it is our firm conviction that the most rational and constructive scenario for the creation of the world was proposed in ancient times by the prophet Moses. This scenario, with surprising immediacy, is recorded in sacred Scripture. In contrast to the scientific concept of the "Big Bang", the biblical version of the creation of the world proved to be unusually flexible and fruitful. It allowed providing conceptual, i.e. semantic, filling of basic categories of the universe with so updated physical content that there appeared real preconditions for construction of comprehensive, quantum-relativistic theory of relative motion.

In his place the reader will be shown how the Mosaic narrative develops into fundamental physical consequences. Here, however, we wish to emphasize the opening perspective of the unification of the tenets of Scripture with the experience of modern natural science. Such a perspective cannot be overestimated, for any advance in this direction is uniquely important for the entire enlightenment culture. It is the author's greatest hope that this circumstance will be his greatest creative success.

The fact is that today the Christian, for example, part of humanity has as if two independent, completely isolated from each other theoretical generalizations with regard to the creation and existence of the universe. On the one hand, we have the divinely inspired books of the Holy Bible, which contain a rather perfect, in the sense of the absence of internal contradictions, picture of the functioning of the universe. On the one hand, we have the divinely inspired books of the sacred Bible, which contain a fairly perfect picture of the functioning of the universe, free from internal contradictions. On the other hand, during the long history of its development, the human community, based on the generalization of everyday experience and a huge complex of scientific research knowledge, has developed its own, so to say, intellectual version of the existence of the universe. The quality of the intellectual model, according to the criterion of external justification, that is, according to the correspondence to the observed reality, is considered to meet the demands of human inquisitiveness much more strictly than the sacred Scriptures.

Usually our worldview is predominantly built on the basis of one of these two theoretical generalizations. Sometimes placing them in a position of fierce antagonism to one another. Although, in essence, science and religion share a common task. They help man maintain an intellectual and psychological balance as he navigates life in this, as the poets say, "world that is beautiful to the point of rage". Science deals with its own problems, believing perfectly well that the universe is designed to suit our cognitive capabilities and is entirely amenable to coherent comprehension by the efforts of the human mind. Religion, on the other hand, holds the reverent conviction that man is conceived and "made" in such a way that his entire personal life is completely subordinate and accountable to a higher reason or, as commanded in church tradition, to the "higher will" that governs the arrangement of the universe.

In contrasting man to the outside world, science puts personal individuality, with its personal claims and modes of self-assertion, in the first place. As the proletarian writer generously shared his innermost thoughts, "I" came into the world to disagree. At the same time, hand on heart, it is not always clear: where did I come from? And where does the ghostly boundary between the non-alternative, existential "I" and the world around me lie? Whereas religion calls for entrusting one's destiny in the hands of divine Providence with humility. The believer, with a trusting delight, breaks down any barriers between his own self and the world around him; it is as if he merges with the divine universe. Strictly speaking, here lie the roots of the bifurcation of the main directions of perception of the external world, and the place in it of the man of deep faith and the traditional naturalist, proudly staying in the ascesis of unyielding atheism.

We do not know how long ago the schism occurred or whether there has been a serene agreement in the minds and souls of men regarding the understanding of the global picture of the world around them. There is no doubt, however, that modern science, devoid of immortal aspirations and hope for eternity, as well as the unprovenness of religious dogma, cannot separately lead humanity to the longed-for absolute truth, which alone can bring us complete satisfaction.

Of course, the irreconcilable confrontation between science and religion, of which humans have been witnesses and active participants for a long time, has in a certain way stimulated the development of religious and scientific research thought in the ways of progress. At the same time, one cannot ignore or fail to understand the perniciousness of the human community's lack of a serene unity of global ideas about the meaning of existence and the modus operandi of the universe. The tragic discord between spirit and reason that haunts every thinking person, and humanity as a whole, is the direct result of the absence in our universal worldview of a higher harmony, whose thirst is as natural and ineradicable as life itself.

There is a great latent danger in the fact that we have no idea to what degree of conflict humans are capable of carrying this confrontation within them. The natural sciences are progressively evolving, and religious conviction is also becoming more profound. The contradictions between them tear at the minds and hearts of men with methodical cunning. The likelihood that man will be broken under the pressure of this confrontation is becoming increasingly threatening. In this alarming and responsible situation, it is extremely urgent to find ways of uniting the tenets of Sacred Scripture with the experience of modern natural science.

The source of hope and optimism in the issue of harmonization of our universal worldview is the obvious unnaturalness of the situation, when the two branches of fundamental culture, marking the development of civilization, do not have in our understanding of reality common points of intersection. Such a situation contradicts the basic principle of cognizability of the surrounding world, arising from the conditions of global unity of the universe and, accordingly, the global generality of the laws governing its existence. The world is one and indivisible, so the contradictions that arise in connection with meeting the needs of the human spirit and mind are primarily subjective in nature. The reasons for them lie within ourselves, or rather in our system of knowledge about the mysterious life of the vast, centuries-long universe, beckoning by its unfathomable horizons.

2. CREATION OF THE WORLD

In proposing two independent concepts of the creation and functioning of the Universe, we mean that from the epistemological point of view they are, in principle, absolutely equal. From a positional point of view, both worldview generalizations look, as they say, "fifty-fifty". Science cannot, by rational methods, extract irrefutable arguments forbidding the presence of divine Providence in the universe. Religion, for its part, is unable to produce categorical evidence of the objectivity of its dogmatic pillars. Meanwhile, to deny the existence of God only on the grounds that no one has ever seen him is as untenable as to question the existence of a permanent magnetic field on the surface of our planet. Which, after all, no one has ever seen and is unlikely to do so.

Proponents of the scientific paradigm of the existence of the Universe, as a rule, in such situations refer to the results of experimental observations. For example, as an irrefutable argument confirming the presence of a constant magnetic field at the surface of the Earth, they cite the readings of the compass needle, always oriented to the north pole. In such a case, a person of religious conviction is entitled to refer to the sacred image of the Blessed Virgin Mary. The image of Our Lady, in turn, points to the authenticity and confirms the authenticity of the historical origin of the Gospel text.

It may be objected that the image on an icon is a matter of imagination, reason, and human hands. However, then we should consider that the magnetic compass needle is also a matter of creative imagination, intelligence and human hands. And the remarkable Serpukhov gas pedal of flying protons, penetrating into the mysteries of the microcosm, is the work of human mind and hands to the same extent as the Trinity Sergius Lavra the center of the Church's sacraments and prayerful hopes for the Christian end of our life. We must realize very clearly that, in essence and in results, the experience of life as a Christian is no different from the inner position and life experience of the naturalist. We have no objective criterion by which to compare the dignity and validity of the worldview conviction of the ascetic of the church with the dignity of the scientific revelations of the Nobel Prize winner in physics.

And what is this very scientific experience, preserved by the authority of high academic departments? The entire history of the development of natural science testifies to the impossibility of extracting an unshakable axiomatic basis for theoretical science from the accumulated research experience. Our ideas about physical reality always remain incomplete and, therefore, imperfect. We are constantly ready to change these notions, to change the axiomatic foundation of physics in order to interpret newly discovered facts in the most natural and consistent way.

This is primarily because science has no inductive method that would lead us directly to the fundamental concepts with which to conceptualize and speculate on the true picture of the world around us. Our thinking is inherently deductive, developing on hypothetical notions and axioms. That is why we do not know to what extent the latter are chosen so reliably and correctly that they alone reflect the real, true state of affairs in the innermost depths of the mysterious life of the immense universe.

In contrast to science, sacred Scripture is a complete set of worldviews that we perceive as once established. It is not subject to, nor does it need any adjustments or refinements. In this sense, sacred Scripture stands in relation to science as a more mature and self-sufficient worldview culture. The mode of application and quality of theological knowledge are marked by their particular transcendent specificity. Whereas science is concerned with making sense of the nature of the material world's existence, religion, for the most part, helps man to maintain a psychological balance between the finitude of his earthly life and the infinity of the universe. Therefore, let us say, no one is going to elevate the electromagnetic field to the rank of the Holy Spirit out of the blue. But no one has the right to deny the very possibility of bringing the axiomatic foundations of science and its logical structures into agreement with the dogmas of Holy Scripture.

Perhaps in none of the problems of the existence of the universe do science and religion occupy such irreconcilable positions as in the interpretation of the most mysterious and majestic act called the "creation of the world". The role of an adequate theoretical scenario of the birth of the universe is of paramount cognitive importance. Because in accordance with its prescription the fundamental conceptual arsenal characterizing the fundamental categories of the universe is laid down: "substance", "space" and "time". Objective perception of the external world we associate with the registration of just these overarching categories. Outside of "space", "matter" and "time" the real observability of the Universe is not invested in our mental imagination. And it is always desirable that the origin of the proposed set of fundamental categories of the universe is based on the smallest possible number of logically independent origins, but covering the widest possible range of all possible physical manifestations of Mother Nature inexhaustible in surprises.

Thus, we can state with confidence that for successful formation of the global conception of the existence of the Universe it is extremely valuable to determine unmistakably how events unfolded in the Universe at the early stages of its existence. If our primary information about the creation of the Universe turns out to be wrong, the fundamental conceptual arsenal will also be doubtful and all the subsequent logical constructions, which allegedly reflect the true physical picture of the surrounding world, will only develop the original inferiority of our universal worldview. It is no coincidence that the first book of Moses, "Genesis", which opens the sacred Scriptures, begins with an account of the creative-educational acts of the divine universe.

Recall the first day of creation according to Moses:

In the beginning God created the heavens and the earth.

But the earth was without form and void, and darkness over the abyss; and the spirit of God was hovering over the water.

And God said, "Let there be light. And there was light.

And God saw that the light was good, and God separated the light from the darkness. And God called the light day and the darkness night. The evening and the morning were one day (Genesis 1:1-5).

This is how simply, with disconcerting immediacy, sacred Scripture introduces us to the great mystery of the origin of the universe.

Much literature, including critical literature, has been produced about the biblical version of the creation of the world. Theology argues that the expression "created" uses the Hebrew word "bara", meaning "to make from nothing". In contrast to the other word "assa", which implies creation out of objectified material. The creation of the world out of "nothing" presupposes the action of divine providence, which does not need any additional means. This is precisely the omnipotence and omnipresence of the Creator.

It is hard to find a more tidbit in the books of the Bible than the creation of the world according to Moses, on which the destroyers of theological dogmas of all times and various schools of philosophy exercise "in the order of duty". Critical thought sees the divine acts of creation "out of nothing" as the most vulnerable side of the Mosaic narrative. The weakness of the biblical version stems from the lack of a clear motivation for the definitions: what is "all" and what is "nothing". On how we can answer these sacramental questions, the credibility of the Old Testament scenario of the birth of the world depends to an excellent degree. In order for scientific thought to reconcile with the religious view of creation, theology must learn to illustrate the physical mechanism for the emergence of matter from nothing the statute of the Hebrew word "bara".

It is well known that modern natural science has its own scenario for the creation of the world, independent of scripture. This scenario ultimately boils down to the Big Bang effect. Science invites us to go back billions of years and consider a situation where all the matter of the universe was concentrated in a limited area of space. One day there was a gigantic explosion of this matter, and it was scattered around the empty Universe in different directions, like a uniformly inflating balloon. As a result of such a universal expansion the whole cosmic conglomerate appeared: galactic masses, planets, interstellar dust. In short, absolutely everything that we characterize as having a rest mass of material objects of matter. According to recent cosmological estimates, the first milliseconds of the universe's existence are the birth of elementary particles and then, a few seconds later, the formation of atomic structures.

It turns out that many elementary particles of matter known to us are direct participants and witnesses of those distant exotic events. Well observed red shift of spectral lines of light signal coming from distant galaxies allegedly confirms validity of Big Bang theory. This is how, in brief, the scientific scenario of the creation of the hospitable universe, which safely survived, to our common joy, to its present state, is presented.

The scientific scenario of creation is also replete with its unanswered puzzling questions. Research thought, for example, is bogged down by the incomprehensibility of the emergence and existence of matter prior to the universe explosion. It is absolutely unclear what happened further in time, after the Big Bang. Where, as a matter of fact, did this very substance come from, which once exploded for some reason. To say nothing of the most complex and diverse problems that emerge in connection with the explosion itself, as we move toward the beginning of the $(t=0)$.

As is often the case in our activities, there is a peculiar fashion here. There was a time when it seemed convenient for science to consider a "pre-explosive" substance in the form of a global primordial egg, which, for some unknown reason, one day burst out and, as they call it, "bang". It is hard to get rid of a healthy desire to look at the funny bird that managed to bring this interesting thing down. Nowadays the hypothesis about the origin of the substance of the Universe as a result of quantum jump, as if from "nothing", strengthens its positions. Which, in fact, is a timid approximation to the biblical version of the creation of the world.

Sometimes attempts are made to circumvent cosmological difficulties by developing a pulsating model of the universe, following the recurring principle underlying the famous song "about pop and his favorite dog". But this maneuver in no way touches the pivotal question of the fate of the universe in its early stages, but only simulates its solution. In addition, the closed oscillating model of the Universe faces serious difficulties due to infinite growth of entropy, which inevitably follows any closed physical system. In general, the situation with the scientific scenario of the creation of the world is no less deadlocked and dramatic than after Moses' words "let there be light". This is because the mass of unsolvable questions surrounding the scientific version of the creation of the world clearly prevails over the quality and quantity of answers.

Theology, in order to accept the scientific scenario of the origin of the universe, makes it necessary for scientists to be able to answer the simple question: who or what is the author of all these complex processes and manipulations which have taken place and are constantly being observed in the universe? No normal person, with his incomprehensibility of the motivation of his own life, can reconcile himself to the idea that he is born as a result of some thoughtless circumstances. And is it possible to indifferently agree with devoid of reasonable expediency, dashingly worked out scientific compilations in relation to the grand scale of the existence of the whole universe? The tendency to search for the mystery of creation by simplifying the universe to some original plasma state or something like that seems too dubious.

And then: why only simplify? Why was such a degrading direction of search chosen? Who decided that to understand the fundamental reasons and high motivations for the existence of the universe it is necessary to go exclusively by the way of primitivization, that is, by decomposition into the simplest components? What can we say about man by decomposing him into elementary particles of matter? After all, we would simply destroy the very object of study. There is no doubt that man, in the final count, consists of a huge set of microstructural compounds, but they do not determine the phenomenology of any individual's existence. These very microparticles, of which a particular individual is composed, always existed on Earth, before he came into the world of God, and they also remain in full composition after his demise. Therefore elementary particles of matter themselves have nothing to do with the phenomenon of human nature. Even if we should ever be able to formulate a complete theory of microcosm physics, this would not bring us one iota closer to understanding the higher meaning and uniqueness of any human life.

But isn't it the same when we try to understand the great mystery of the creation of the Universe, reducing this act to the birth of primitive material formations, to the physics of the microcosm? In this connection it is necessary to think thoroughly: can there be no Universe at all and is it not a useless exercise — to make a birthday party for the Universe? At least for the simple reason that modern scientific conceptions of the category "time" are so meager and unreasonable that it is not quite prudent to extend our laboratory chronometry, which practically ticks in unison with the wall clocks of Pavel Bure's manufactory, to the scale of functioning of the whole Universe.

In general, characterizing the effectiveness of the intellectual potential of the scientific scenario of the creation of the world, it is necessary to recognize that for all the seeming grandiosity and extravagance of the Big Bang theory, in the philosophical background of this hypothetical assumption, there is a clear deficit of creative ideas, embodying the active creative beginning. We mean such prospectively charged fruitful ideas, which are able to fill our idea of creation and development of the universe with the highest harmony and expediency. In any case, it is fair to say that if science seeks the mystery of creation by simplifying the universe into some kind of plasmic state, then, to the credit of religion, it turns its gaze to more life-giving, creative principles.

Of course, the reciprocal claims and demands of science and religion should not reach the point of absurdity. For in response to an atheist's wild request to show him the resting place of God of hosts, a believer can always demand that the atheist demonstrate the stool's ability to sing "Faust", in full accordance with the evolutionary logic of dialectical materialism. Nevertheless, we can see that the opposition between science and religion, especially with regard to the creation of the world, is quite uncompromising and double-edged.

As already noted, the problem of the emergence of the universe is of an extremely heuristic nature, since as a result of this act the fundamental categories of the surrounding reality: "matter", "space" and "time" are filled with physical content. The logical series of inverse sequence suggests that the depth of our penetration into the great mystery of the creation of the world depends to a great extent on how adequately the conceptual attestation of the fundamental categories of the universe succeeds. And the quality of the whole set of physical laws, according to which the development of the Universe is realized, in essence, is determined by our ability to reliably conduct, so to say, full-fledged semantic attribution of categories: "substance", "space" and "time".

Intuitively we imagine that the space-time properties of the world skeleton and the properties of matter, i.e. material stuffing, should be closely interrelated and interdependent with each other. This means, in particular, that space and time with given properties can contain stuffing only of certain physical conditions. Conversely, the given properties of matter do not allow arbitrariness in the choice of the space-time framework. The connection between the fundamental categories of the universe undoubtedly exists, but revealing its nature is, in fact, very, very difficult. In order to cope with this task, we need to make a small historical excursus, which will allow to trace the process of formation of scientific ideas about categories: "substance", "space" and "time".

When the subject of theoretical research is a fundamental problem, a special responsibility falls on the factor of correctly posing the question to the object of our interest. In science, the ability to ask the right questions of nature is always highly valued, and this requirement increases as the scope and depth of penetration to the origins of the chosen problematic increases. The more fundamental the cognitive status of the object of our attention, the wider the field of its application, the more diverse the range of disciplines involved in the research process. Therefore, we must be able to distinguish the most essential and critically important issues from the resulting diversity.

It is impossible to designate literally any direction in physics, which in one way or another would not come to the problem of adequate material attestation of the fundamental categories of the Universe. Any physical discipline has the right to claim a prominent role in questions of conceptual interpretation of the overarching entities — "matter", "space" and "time". After all, the general subject of this science is everything that happens to matter in space and time. Before we start working with these fundamental categories, we must define a formal platform, which will sufficiently limit the infinite variety of all possible approaches to this problem.

If it is true that the development of science takes place in the direction of the increasing simplicity of its logical foundations, we can distinguish, in principle, a formal platform of four theoretically permissible settings within which research thought can consider the categories "space" and "matter" in terms of their possible material attribution. In this case, the four theoretically permissible settings are those in which matter and space can be considered alternately as matter or other physical substance.

Let us succinctly write down these four fundamentally permissible attitudes in the following sequence:

First, we can assume that the category of matter, say an elementary particle is matter. And space is not matter; in other words, it is empty.

Second, we can take space as matter and the elementary particles of matter in it as holes of emptiness.

Third, we can define space and the simplest elements of matter as two completely different and independent kinds of matter.

Finally, we are able to declare space and matter in it as derived from a single material substratum. As derivatives of matter, capable of taking different qualitatively distinctive forms, depending on the peculiarities of the existing physical conditions.

In this revision, the four foundational formulations are deliberately simplified to the extreme through linguistic brevity and parsimony of content. This technique narrows as much as possible the sector of searching for an adequate theoretical equivalent for the fundamental categories of the universe. The settings do not allow the research thought to be led away to abstract, far-fetched constructions that are not invested in our mental imagination. Certainly, there will be some demanding opponents who will protest that in reality the nature of relations between space and matter is much more complex and varied than in the proposed attitude formulations. Maybe, maybe. But as a matter of principle any other variants are from the evil one. No matter how we manipulate, with an unbiased and consistent consideration, our logical constructions inevitably come back to the fundamental question of what is "space" and what is "matter" in their original physical sense. Is it matter or is it absolute emptiness?

Democritus, for example, in creating his famous philosophy, having carefully compared and summarized the accumulated everyday experience, came to the conclusion that there are two primordials in nature — atoms and emptiness. Atoms are indivisible particles of matter, they are eternal, they are in constant motion, and all kinds of bodies are formed from combinations of atoms of different shapes and sizes. By emptiness, no doubt, was meant space. In relation to the four formally admissible attitudes for the possible material attestation of the fundamental categories of the universe, Democritus' philosophy clearly agrees with the first attitudes mentioned above. It assumes that the category "matter" is matter and the category "space" is emptiness.

However, the mirror image of Democritus' division of the world into two primordials, as if with opposite sign, is fixed in the second founding formulation. According to which we can consider space as matter and elementary particles of matter as holes of emptiness. Again, as holes of infinitely different configurations and all kinds of magnitudes.

Democritus' philosophy has for centuries firmly dominated natural science, defining the strategy for the development of our relation to reality. The main advantage of this worldview paradigm was that, relying on brute everyday experience, i.e. on the information available to our direct observations, it allowed researchers to operate with concepts that easily fit into an imaginative speculative visibility. The division of the world into void and matter provided an ideal opportunity to interpret figuratively any form of motion and to explain any physical processes occurring in the world around us.

It is very important that Democritus' empty space was symmetrically superimposed on Euclidean geometry, according to which the shortest distance between two points is a straight line. The scientists' conception of free motion was therefore comparable to the geodesic lines of Euclidean geometry and accepted as uniform and rectilinear. The most perfect scientific expression of Democritus' philosophy was found in Newtonian classical mechanics.

In this mechanics there are three fundamental conceptual categories: absolute empty space, absolute uniformly flowing time everywhere, and massive material objects of matter, which, by the way, appear in Newtonian theoretical usage as material points. Massive bodies, according to Newton, can interact with each other by coming into direct contact. In the case of gravitational attraction, momentary long-range forces come into play.

For a long time it seemed that such a universal conceptual arsenal was quite sufficient to describe any physical processes observed in nature. True, some inconveniences were caused by the mysterious forces of gravitational long-range action, but in general the basic platform of scientific natural science looked quite convincing and safe. It seemed to many that one more small effort was required — and nature would open its last unread pages.

When science began to study electromagnetic interactions, the situation of researchers changed radically. Scientists plunged into the area of phenomena hopelessly closed to our direct observation and, most importantly, not invested in the usual visual notions of the division of the world into two primordials. All attempts to find an adequate physical equivalent for registered electromagnetic processes, within the framework of Democritic philosophy, did not give the expected results. Electric and magnetic forces did not find in our mental imagination an adequate physical embodiment — either as emptiness or as matter.

It soon became clear that all-powerful Newtonian mechanics, too, refused to describe newly discovered objective realities. At first, efforts were made to present electric charges as a special kind of material form of matter, between which certain forces act like gravitational forces. But this special kind of matter did not reveal its main fundamental property — inertia. And the forces acting between charges and weighty masses of matter remained unknown. In addition, the polar character of electric charges did not fit into the classical scheme of Newtonian mechanics.

Unexpectedly, scientists found themselves in the position of a pedestrian pushed blindfolded onto the roadway. After all, no one could clearly explain how electromagnetic interactions are realized and what physical processes are hidden behind this phenomenon. No one knew whether the newly discovered interaction was a manifestation of a special property of space — or it was the result of some exotic possibilities of matter and what, in this case, could be called "space" and what — could be called "matter".

It is believed that science was able to get out of this predicament thanks to the electromagnetic field theory of Faraday and Maxwell. The innovation of Maxwell's theory consisted in the fact that the interaction between test bodies, caused by electric and magnetic charges, was represented in it as a consequence of the influence not of mysterious forces of instantaneous reaction, as it happened in classical Newtonian mechanics, but of processes propagating in space with a finite speed. However, the behavior and characteristics of these objectively detectable interactions did not fit into any of the previously known fundamental categories.

This is how it was decided to introduce a new, fourth fundamental conceptual category, called "field," in addition to the three already existing ones: "matter", "space", and "time". Thus, in theoretical constructions related to electromagnetic processes, the field took a firm position together and along with material points, which in Newton's mechanics signify the mass of matter.

It should be noted that from the philosophical point of view, the idea of propagation of the electromagnetic field in empty space, realized in Maxwell's theory, was nothing but a transposition of the famous Kantian definition number one in his "Metaphysical Elements of Natural Science". Thus, Emmanuel Kant asserted that "Matter is something mobile in space . That space which is itself mobile is called material, or relative space, that in which all motion must ultimately be thought of (and therefore itself immobile in all respects) is called pure, or absolute space". Further, in a note to the definition, Kant develops its content, arguing that absolute space is not an object, because it cannot be perceived by us as an object of direct experience. It is something conceivable outside the given, so to speak, actually observable space. The space actually comprehended by experience must necessarily be material, but it also presupposes the existence of another, broader space in which the former is able to be realized.

The electromagnetic theory, in full accordance with Kantian philosophy, represented the electric and magnetic field as a special kind of relative material space, which was "placed" in a broader, absolute empty space. After all, one cannot deny that the mathematical facture of Maxwell's equations does not suggest the existence of any new conceptual substance that is not an expression of space and time. Perhaps the authors of the electromagnetic theory, instead of the newly introduced concept of "field", which has greatly complicated our ideas about the physical status of the fundamental categories of the universe, would be most natural to resort to the formulation of "relative electromagnetic space".

Nevertheless, a very mysterious definition of some incognito has been launched into science. After all, to this day no one is able to tell us, in a form accessible to our imagination, what this very electromagnetic field is. What does it look like and how does it differ from space or matter? Of course, here we do not take into account all kinds of hypothetical inventions, which, as usual, imply something, hint at something, but are built on such doubtful assumptions and suppositions, after which it is simply impossible to consider them as prerequisites for declaring a new fundamental category.

It must be assumed that two circumstances played a major role in the decision to refer to the concept of "field". This is, of course, the special complexity arising from the apparent selectivity of electromagnetic forces. Not all bodies succumb to their influence, and it was not entirely convenient to combine electromagnetic processes directly with the concept of "space". But most importantly, the application of the new conceptual category freed researchers from the need to attribute the newly discovered physical reality within the rigid framework of Democritus' division of the world into two primordials. It is always much easier to come up with a new conceptual definition for an unknown phenomenon, which in essence does not express or clarify anything, than to bring this phenomenon into conformity with the most limited range of logically independent primordialities. Such as those which are succinctly formulated in the above four principles for the material attribution of the fundamental categories of the universe. In short, in the case of the electromagnetic theory, science took the path of least resistance, and as usual, not the most grateful way.

A very big disadvantage of the new theory was that it did not even attempt to offer any effective physical justification for the nature of the origin of the electromagnetic field. Maxwell's differential equations were limited to linking the spatial and temporal derivatives of the electric and magnetic fields, and the electric charges themselves were considered as regions with a non-zero electric field divergence. In fact, this theory did not so much describe the real physical processes behind the electromagnetic interactions as it clothed them in a rational mathematical form.

With the appearance of Maxwell's electromagnetic theory, a very important turning point in the history of natural science was realized. It was then that scientists for the first time frankly abandoned the search for a specific physical image corresponding to objective reality and began to be satisfied with its mathematical analogue, consisting of a set of metric coordinates-signs.

The absence of a visual speculative image for this newly discovered, undoubtedly objective physical reality initiated the development of a very insidious conceptual crisis in the attribution of the fundamental categories of the universe. The crisis, which, as it will be shown below, has not lost its relevance to the present day. For it has penetrated into virtually all fields of modern physics, and the very conceptual definition of "objective reality" has become a subject of very serious controversy for the entire scientific community.

The fact is that the language of mathematics, by itself, does not presuppose the formulation of any semantic conceptual equivalents. There is no dispute that mathematical analysis can project the internal logic of physical phenomena and provide tangible progress on the paths of comprehending the truth. Our ability to quantify observable physical processes greatly enriches the cognitive abilities of researchers. But no mathematical structure can ever replace the conceptual foundation of physics. Ultimately, the goal of all cognition is not simply to establish "how much?" but, most importantly, to arrive at an understanding of "how?" and "why?"

The most paradoxical characteristic of the conceptual crisis in modern natural science was presented, without knowing it, by the legendary academician Landau. It refers to his winged statement that "a man is able to understand things he cannot imagine". In fact, Lev Davidovich concocted a magnificent retort to Malevich's "Black Square", or, as our beloved school teachers used to humor him, "you look in a book and see a figure". If a scientist begins to think that he is able to understand things that he cannot imagine, this is not cognition of the world around him, but the most beautifully spiritual theology. This is the destiny of religion: to believe in things that cannot be imagined or described by intellectual means.

Some may be satisfied with the academician's extravagant statement that he is well versed in things that he is unable to imagine. But then one has to wonder, on what grounds does the eminent scholar impose limits on the potentialities of human imagination? Isn't it fairer to argue that we are intellectually incompetent to provide adequate conceptual equivalents for physical reality?

In all probability, by the definition of "understanding" Landau means his ability to describe objective physical reality with the help of mathematical tools. However, it should be realized that the world around us functions safely by itself without paying any attention to our ability to give it a mathematical formulation. The world exists solely and only according to physical laws. Therefore, any physical process, if it is adequately understood, must have a full conceptual support that is subject to our speculative perception. Otherwise, we will have to admit that human consciousness is in principle incapable of comprehending physical reality, and then any science loses its objective cognitive sense.

Thus, we can state fairly confidently that as a result of the emergence of Faraday and Maxwell's electromagnetic theory, a new fundamental conceptual category called the "field" was launched into scientific usage. One of the direct consequences of this innovation was the inevitable development of an acute conceptual crisis that affected the semantic basis of natural science. The introduction of a new fundamental conceptual category happened without any acceptable theoretical accompaniment. As a result, the sacramental question was left open and aggravated: what is actually "space", what is "matter" and now "field" in their original physical sense? What are the differences, how do these fundamental physical categories coexist and interact, and which of them, finally, is emptiness and which is matter? And if matter, how many kinds are there? What is its structure? How is it related to energy? What is inertia? And much more.

No reconstruction of the formation of electromagnetic theory can be considered complete without the outstanding contribution of the Dutch scientist Hendrik Lorentz. In fact, he paved the way for the construction of Einstein's electrodynamic theory of moving bodies, later called the "Special Theory of Relativity". The point is not only that all the main relativistic effects of the special theory derive from Lorentz's transformations. The main merit of Lorentz was his writing of systems of equations linking spatial coordinates and moments of time of the same event in two different inertial reference systems.

Moreover, these solutions were composed as transformations, in relation to which the equations of electrodynamics preserved their form. Einstein had only to expand the idea of invariance of electromagnetic processes with respect to the Lorentz transformations and extend it to all physical processes, all without exception. That was brilliantly done by the author of the theory of relativity on the basis of a subtle analysis of the known identity between optical and electromagnetic physical interactions.

It must be said that at the time of the creation of the private theory of relativity the situation in the attribution of the fundamental categories of the universe sharply worsened due to the negative results of experiments on the detection of the etheric wind. The results of these experiments were expected by the enlightened scientific community. They, as it seemed, were supposed to end the confusion around the definition of the conceptual status of the physical category "space".

The results of the experiments on the detection of the ether wind effect not only did not contribute to solving the problem of reliable physical attestation of the category "space", but on the contrary — completely confused the situation. The main result of these experiments was that the discovered physical properties of near-Earth space came into contradiction with the basic rule of classical mechanics about the addition of velocities. This rule, which allows the transition from one inertial reference system to another, obviously did not agree with the principle of constant propagation of the speed of light in the void.

The results of the experiments on the registration of the ether wind effect exposed the urgent need to revise our attitude to the category "space" and directly motivated the construction of the relativistic theory of motion. In a certain sense, it can be argued with great probability that with his electrodynamic theory of relative motion Albert Einstein hoped to bring the attestation of the category "space" in such a serene state, which would eliminate the contradictions arising from the results of the experiments on the detection of the ether wind. The paradox, however, is that the scientist tried to carry out a revision of the conceptual status of the physical category "space" by means of a theoretical generalization, the mathematical apparatus of which was entirely borrowed from the electromagnetic theory, which initiated the development of an acute conceptual crisis around the attribution of the fundamental categories of the universe.

The continuity of the theory of relativity, of course, could not be limited to mathematical facts. Together with the equations, inevitably, the electromagnetic theory had a deficit in its conceptual arsenal. The theory of motion proposed by Einstein, just like the electromagnetic theory, did not offer any considerations about the real physical content of its conceptual foundations. Simply put, the theory of relativity offered no meaningful conceptual equivalents expressing the real physical properties of matter, space, and time. The most that Einstein could afford — to do was to formulate light postulates, which are only an expression of objective metric properties of real space-time. However, the physical nature of the origin of these postulates remained beyond the "reach" of the cognitive possibilities of the theory of relativity, and therefore the light postulates became one of its most incomprehensible aspects.

Nevertheless, in that extremely controversial environment, the creative power of Einstein's intellect played an enormous role. Perhaps more than anywhere else, the extraordinary imagination of the author of relativity manifested itself in his awareness of the objective ambiguity of determining the simultaneity of two events separated in space by relative speed. Having deeply analyzed the procedure of observations and measurements in recording the results of relative motion, Einstein refuted the Newtonian notions of the absoluteness of space and time. With the help of witty mental experiments, the scientist proved their objective physical relativity. As soon as time lost the quality of an absolute, everywhere uniformly flowing substance, our attitude to the world around us changed radically. It became obvious that the existence of space and time in isolation from each other, when describing the kinematics of motion, contradicts experimental logic, and therefore these two fundamental categories cannot have separately adequate theoretical support.

The theory of relativity has convincingly demonstrated that the four-dimensional interpretation of space-time relations is the only possible, moreover, it can satisfactorily comment on the negative results of experiments on the registration of the ether wind effect. As a consequence of Einstein's creative efforts, another fundamental conceptual category called "four-dimensional space-time" became possible. The presence of the latter as if removed from the agenda the problem of attribution of the categories "space" and "time", taken separately.

Einstein had no great difficulty in finding the necessary mathematical manifold to combine space and time into a single topological fabric. Herman Minkowski's equation offering a solution to this problem was widely known in science. However, extrapolating this topological structure to a full-fledged conceptual basis turned out to be a far from easy task, though certainly quite desirable. The point is that objective physical properties of a given spatial interval and a certain period of time are profoundly different. Their combination requires some specific, hitherto unknown to theoretical science moves. It is not accidental that among the most mysterious aspects of the theory of relativity, first of all for our speculative perception, is its four-dimensional treatment of space-time relations.

Of course, the theory of relativity, like any other theoretical generalization, has its cognitive limit, beyond which there are questions that do not lend themselves to rational explanation within the framework of this conceptual system. In my place, we will analyze in detail the problems related to motion, which cannot be unraveled by the efforts of the theory of relativity. Here we will limit ourselves to focusing our attention on the conceptual insufficiency of its spatio-temporal arguments.

It is curious that Einstein himself was extremely accurate in his choice of formulations and definitions. In cases where dubious, ambiguous situations arose, he skillfully manipulated and shifted the problem from a physical conceptual platform to a topological one, but he steadily pursued his ideas to their intended goals. The methodological credo of the theory of relativity is quite frankly formulated in the introductory part of Einstein's famous article "To the Electrodynamics of Moving Bodies". Where, in particular, it says that "the theory developed by the author is based, like any other electrodynamics, on the kinematics of a solid body, as the judgments of any theory concern the relations between solids (coordinate systems), clocks and electromagnetic processes. In this statement, reproduced verbatim, the scientist clearly shows a deliberate tendency to carefully avoid the direct use of the expression "space". It would seem that how can one talk about the kinematics of a solid body outside the category of "space"? Nevertheless, the author of the theory of relativity prefers to carefully avoid this insidious definition.

In his mission statement, Einstein substitutes the concept of "space" with the wording "coordinate system". As a result, a subtle maneuver is carried out, which allows to translate a purely physical category into the geometrical plane. At the same time, the necessity of its physical attestation is automatically lost. This sufficiently effective research technique of description of physical realities with the help of a set of metric coordinate projections serves as the central axis, on which the whole theory of relativity is mounted.

Meanwhile, this situation does not mean that we should unconditionally follow the theory of relativity, contrary to common sense, which does not allow a total replacement of physical realities by mathematical constructions, due to the possible loss of control over the very subject of our research. This method, borrowed from Maxwell's electromagnetic theory, translates purely physical realities into the field of abstract geometrical constructions, which most of all demonstrates the inability of research thought to select adequate conceptual equivalents for the surrounding reality.

The fact is that in the real observable surrounding world the motion is realized within the interaction only between the physical categories — "space", "time" and "matter". And all this happens without involvement of any mathematical services. Therefore, the choice of mathematical apparatus and the procedure of its use must be strictly subordinated to the logic of cause-effect relations. When, first of all, it is necessary to reconstruct a physical picture of relative motion — and only after that to select adequate mathematical tools for it. And in no case try to distort the logical sequence of the cognitive process, starting from mathematical constructions. That is to artificially stretch mathematical consequences to the level of physical causes, which determine the inherent objective laws of Mother Nature. This methodology should be called "penetrating into the global picture of the outside world from the back door".

An exhaustive theory about the movement of material objects relative to each other must reflect objective reality and be able to describe the physical nature of the movement process itself. In other words, to describe the qualitative side of motion as the result of interaction between the fundamental categories of the universe. And only after that should we be able to quantify the results of motion with the help of mathematical formulations. The theory of relativity, in this sense, is not flawless. It persistently tries to bypass the qualitative side of motion and reduce our knowledge of it to a quantitative assessment by means of the geometrical equivalent associated with the observed physical process.

There is no doubt that Einstein knew all the weaknesses of his theory of relativity better than anyone else. That is why many years of his creative biography were devoted to concerns about the construction of a unified field theory. According to the plan of the latter, it was supposed to bring the fundamental categories of the universe to a single field substance and find for it such geometric expressions, which could cope with the description of all existing types of physical interactions. And at the same time, beyond expectation, to put an end to the deep conceptual crisis that had struck the foundations of natural science.

As it was already noted, physical properties of the space-time frame and material stuffing are closely interconnected and do not allow arbitrariness in their choice. Therefore it is quite natural that the conceptual crisis, which broke out in the questions of description of the world space-time frame, inevitably spread over to the material stuffing.

Firstly, it turned out that elementary particles of matter are not just material corpuscles, but can and should be considered as wave formations. Secondly, it turned out that we are not able, as it happened in classical mechanics, to give unambiguous mathematical definitions of what really takes place and happens with matter in space and time. Instead, theoretical science began to give us probability distributions for possible changes and states as functions of time.

As a result of a number of interesting discoveries, which came to science mostly by experimental way and often without proper analytical support, a whole new section called "quantum physics" appeared in natural science. It is a very powerful section that actively deals with the behavior of matter, i.e. material stuffing. Just like the theory of relativity, quantum physics is deeply penetrated by an acute conceptual crisis. Until now, not a single expert has been able to explain intelligibly what lies behind the corpuscular-wave dualism, for example. How does the combination of these specifically aggregate, mutually exclusive states of matter happen in nature?

In the end it came down to the fact that the key equations of quantum physics were introduced into science in a random manner. About the same way the well-known solutions of electromagnetic theory were widely accepted. It cannot be denied that the basic equation of Erwin Schrödinger does not really follow from anywhere and does not follow from anything. It is postulated as a certain mental given, on which the whole complex of quantum physics, working rather effectively, is erected. However, deprived of adequate conceptual algorithm Schrödinger's equation builds a serious obstacle on the way of development of quantum physics itself. Without understanding to the end what actually stands behind it, what physical reality hides behind this equation, which has become a classical one, we will never be able to provide progressive development of fundamental science.

If we turn to the past, we can easily establish that almost a hundred years have elapsed since the very time when the desperate conquerors of scientific Olympus, led by Albert Einstein himself, opened an account of unsuccessful attempts to bring together the theory of relativity and quantum physics. By the way, they came up with a name for this joy ahead of time: "Unified Field Theory". A hundred years, in today's times — is too long a period to stagnate in one place and take comfort in the dubious assurance that scientists have learned to understand things beyond the resource capabilities of human imagination.

It is significant that all these long years of colossal efforts were aimed at solving the most critical problem of modern physics exclusively by mathematical means. That is, by the means that, in essence, created the acute conceptual crisis. Though in fact nothing forbids to turn back a hundred years, go back to the common sense and try to find an effective conceptual base, on which both quantum physics equations and relativity theory can be organically applied. Perhaps with limiting constraints, beyond which a different, more advanced mathematical apparatus enters into force. Akin to the limitations that modern science imposes on Newtonian mechanics.

Thus, our penetration into more and more complicated realities of surrounding world led to the fact that the modern state of science became characterized by presence of two global physical generalizations, essentially independent from each other — the theory of relativity and quantum theory. At that, theory of relativity deals with description of geometrical properties of space-time framework, and quantum theory — with description of material stuffing, in other words, with consideration of substance behavior. It is significant that separately each of these scientific generalizations is quite satisfactory in describing a certain range of phenomena under study. However, the applicability of any one of them is very problematic outside the limited field. It seems as if the constituent fragments of the expected unified field theory are contained in both concepts mentioned above and it is only necessary to find carefully verified non-standard approaches, allowing to conclude the desired union between relativity theory and quantum physics.

The theory of relativity, without any doubt, should keep its relevance as a doctrine defending the description of laws of nature by means of spacetime relations (actually, we have no other alternative). But it should do this, apparently, not by means of differential equations offering regular solutions, but by establishing quantum topological equivalents characterizing kinematics of relative motion. It is at least possible to hope that fulfillment of this condition will become a logical connection, which will lead to the desired synthesis of relativity theory with quantum regularities.

This does not mean that future successes of theoretical physics lie in the ways of adapting relativity theory to quantum regularities and, of course, on the contrary — adapting quantum theory to the logic of Einstein's spacetime relations. When, for example, one tries to obtain quantum effects as derived from geometrical settings of relativity theory. The futility of such efforts is evidenced by all kinds of developments of more complex spacetime topologies, which have never been formed into a complete system of views in the hope of extending them to a wider range of natural phenomena.

For the natural fusion of these two fundamental theoretical generalizations, it is most likely useful to step back to the original lines and try to formulate, at the very origins of our knowledge, the optimal conceptual framework. We need to fill our notions of "space", "time", "matter", and even "field" with such an updated conceptual content that will allow us to correct both opposing concepts at the same time. To do this in such a way that they seamlessly merge into a single mathematical fabric. The researchers' entry into perspective for the attribution of the fundamental categories of the universe, in turn, involves the development of an effective model of the creation of the world. After all, the real physical filling of these fundamental categories takes place directly in the course of realization of the Universe birth scenario.

The author did not accidentally make a brief review of the formation of critical problems facing modern theoretical physics. It was necessary to make such a historical excursion in order to present more fully the general situation developing around the attribution of the fundamental categories of the Universe and to evaluate objectively the environment in which the formation of the scientific scenario of the creation of the world took place. As follows from the above, this environment was characterized by the most complicated conceptual crisis which affected our ideas about the fundamental categories of the universe. This crisis was inevitably transformed into a scientific interpretation of such a great educational-creative act, which has the proud name of "the creation of the world".

So we have two theoretical scenarios for the origin of the world — divine and scientific. In addition, we have a really acting Universe, in a single copy, with its own non-alternative course of evolutionary development. Let's try to figure out which of these two scenarios corresponds to the results of experimental works, unifies our thinking and contains the smallest number of logically independent initial elements. Combinatorics of which allows establishing the interconnection of the whole complex of physical laws, according to which the development of the Universe is realized.

First of all, let us carefully consider the scientific version of the creation of the world according to the Big Bang scenario. Let us recall the origin of this theory. In his time, the American astronomer Ernest Hubble, observing the universe through a telescope, discovered the red shift of the spectral lines of the light signal coming from distant galaxies. The most naturally recorded red shift was interpreted as a Doppler change in the light signal coming from galaxies moving rapidly away from us (and from each other). As the information obtained was processed, it became more and more evident that the law of galaxy recession in all directions is universal and universal, as if the expansion of the Universe as a whole takes place. Another important discovery was that the scattering of galaxies in all directions occurs at speeds proportional to the distances to these objects. According to the laws of formal logic, the assumption was that a certain period of time ago all the matter of the Universe was concentrated in a limited region of outer space. The assumption turned out to be fruitful, and science rushed towards the Big Bang theory.

We give a historical summary of the formation of the Big

Bang theory only to demonstrate the blatantly random nature of its emergence. No one set scientists the task of inventing a birthday for the Universe. There was no broad scientific search, no deep systematic analysis, which must necessarily accompany the construction of such a super-scale generalization, which is the scientific concept of the creation of the world. The task, in fact, was very simple: it was necessary to explain the unexpectedly discovered shift of spectral lines of light signal coming from distant galaxies. The solution of this seemingly "one-way" problem led to the emergence of a global scenario of the creation of the world.

To be fair, one cannot but remember professor Alexander Friedman of Petrograd University, who even before Hubble's discoveries found nonstationary solutions of the gravitational equations of general relativity, thereby indicating the possibility of the existence of a nonstationary Universe. However, Friedman's work did not have a direct influence on the emergence of the Big Bang theory, for a number of reasons.

No one would deny that nature contains an objective relationship between the whole and its parts. The correct distribution of these relationships can provide a certain security for successful comprehension of the physical process or phenomenon we are interested in. The most common mistake in reasoning about the parts and the whole is to treat particular features as decisive arguments for determining the general properties of the objects under study. When, for example, referring to the color of the sea wave, trying to reconstruct the mysterious history of the origin of the Indian Ocean. Such methodology is categorically unacceptable, and it is even more unacceptable when working on the creation of such a quasi-scale generalization, which is the mysterious scenario of the creation and development of the Universe. It is impossible to agree with the explanation of the shift of spectral lines of light signal coming from distant galaxies, by presenting a new theory of the creation of the universe. Which, in fact, is what happened in the case of the Big Bang theory. From the whole to the particular, as the saying goes, "please", but never the other way around.

Unfortunately, all the complex construction of our various scientific ideas about the development of the Universe has been erected mainly in this vicious way - from the particular to the general. That is why we are constantly adapting, endlessly adjusting our information about the life of the Universe to newly discovered particularities. The imaginary unity of the physical picture of the world that we recreate is, in fact, very unstable. The entire centuries-long experience of the development of natural science, with its endless adjustments and restructuring, testifies to this. First of all, this happens because we still do not understand the final goal of the very process of cognition, which has been going on for several thousand years according to the principle "from the particular to the general". What about the goal! We are not even sure about the correctness of the chosen course, according to which natural science is developing. It is possible that all theoretical constructs, with the help of which we orient ourselves in the world around us, have nothing to do with reality at all, but are only a product of our mental self-expression.

In this sense, sacred Scripture provides us with a unique opportunity to construct an optimal model of the universe, observing the most promising methodology of following from the general to the particular. The book of Genesis, in perfect harmony with the mode of inductive modeling, immediately unfolds before us the general picture of the origin of the universe, in its finished form. For us this is the only, unprecedented opportunity to reconstruct the true picture of the origin of the universe on immutable, once and for all laid down foundations.

Of course, science should not take a "posture" in doing so, but should respectfully read the prophet Moses. It is impossible not to take into account the time when this book was written and the appropriate level of intellectual equipment of the potential reader. Most importantly, one must try to find an adequate physical equivalent to the events described in the first days of creation according to the book of "Genesis". In any case, we have no right to neglect such a unique opportunity. The authority of sacred Scripture is too high, incomparable to anything.

Returning to the Big Bang theory, we note that with respect to the above four principled settings, within which theoretical thought is able to make material attestation of the categories "space" and "matter", this concept clearly adheres to Democritus' division of the world into two primordials: "matter" and "space-empty". The most primitive, ancient philosophical attitude is invisibly present in the scenario of the universal explosion. The scientific version explicitly states that some time ago all the substance of the universe was concentrated in a limited region of outer space — and suddenly, as a result of a giant explosion, scattered across the void in different directions.

There should be no doubt that any of the four principled settings, for the possible attribution of the fundamental categories of the universe, are entitled to claim exclusive attention in developing a theoretical scenario of the creation of the world. In this sense, they are fully equal. However, attitudes that divide the world into two primordials inevitably find themselves at odds with the fateful questions: who divided it? Why? When? How? To assume that the world has always consisted of two independent primordials, — means to irrevocably abandon the idea of reducing the fundamental categories of the universe to a single material substance and, consequently, to abandon forever the possibility of merging relativity theory with quantum physics, that is, the creation of a unified field theory.

And then, where does such luxury come from? All of our centuries of experience suggest otherwise. We are confronted at every turn with the utmost avarice of the creator-nature. In this regard, the wasteful idea of dividing the world into two primordials seems very irrational. Especially since there is no positive reason forbidding the reduction of the universe to a single all-encompassing substance.

From the comparison of a set of accumulated experimental observations it follows that in different directions from the Earth, in the depths of observable space, galaxies, in equal volume regions of space, are distributed uniformly. In addition, in large-scale measurements the velocities of their dispersal in all directions are also the same and depend only on distances to investigated objects. Hence, the conclusion about the possibility to consider the observable part of the Universe as homogeneous and isotropic, which is quite unexpected in the conditions of the explosive origin of the Universe. In order for the fragmentary material ejected from the epicenter of the Big Bang to be uniformly and isotropically distributed in the cosmic space, a very specific organization of the initial conditions of the grandiose fireworks must be realized, which is difficult to explain in natural terms.

It should be kept in mind that in all developed dispositions of the Big Bang the initial stage of this event very much depends on the selection of special conditions. When the fitting of parameters is realized with a precision unparalleled anywhere in physics. It seems as if the providence took care of the preparation of favorable conditions for the appearance of almost every elementary particle. And only in the visible part of the Universe, according to our most modest estimates, there are about $\boldsymbol{10^{80}}$ of them.

Speaking about extreme accuracy of fitting of parameters at the early stage of the Universe one can recall the "cosmological constant problem", consisting in the fantastic assumption that the initial vacuum energy should be different from zero and "prepared" with accuracy up to $\boldsymbol{10^{-106}}$. Such requirement imposes the mechanism of compensation of vacuum density jumps arising later due to phase transitions in gauge theories of large association. In the present study there is no necessity to describe in detail all mechanism of "running up" of this incomprehensible value, we will limit ourselves only by statement of the fact of its existence.

Continuing, the mystery of the incredible proximity of the universe, at an early stage, to a three-dimensional flat $\boldsymbol{(k=0)}$. This conundrum is traditionally referred to as the "plane problem". It is conditioned by the fact that the successful development of the universe, from the moment of the explosion to the present state, requires a very fine adjustment of the parameter $\boldsymbol{\Omega}$ — the ratio of the average energy density in the Universe to the so-called "critical density". Einstein's equations, on which modern cosmological models are based, are formulated in such a way that it depends on the value of $\boldsymbol{\Omega}$ whether the expansion of the Universe will be replaced by contraction or the expansion will continue indefinitely. In order for the Universe to develop according to the Big Bang scenario and to survive, according to the predictions of the theory, to our days, the fitting of the parameter $\boldsymbol{\Omega}$, at an early stage, must be no less than $\boldsymbol{10^{-59}}$. If this condition will not be observed, then for the closed Universe the expansion will be replaced by contraction in time close to the Planck time, and the open Universe will expand so rapidly that significant masses of matter will not have time to form. We will not, for lack of necessity, describe the full calculation of appearance of this incredibly small value, we will note only the alarming fact of its existence.

The presence in the Big Bang theory of fantastically small quantities, which have no analogues in theoretical physics, is the content of the most mysterious side of this event and makes us fear that here we are dealing with a case of artifact. In science there are a great number of such examples when at first there appears a preconceived idea and then, in favor of it, the corresponding justifying arguments are chosen. And, as a rule, these arguments, by virtue of the far-fetchedness of the general idea, have an extraordinary, nowhere else found character.

Usually the supporters of the "Big Bang" theory refer to the uncommonness of the event, its exceptionality and, consequently, the possibility of introducing some "peculiarities". Simply speaking, they start to choose convenient for themselves rules of the game and play the universal puzzle on their rules. Although the fundamental problem of cosmology consists precisely in building a theoretical model in which the Universe lived and developed to its present state absolutely independently of peculiarities of initial conditions, obeying only the fundamental laws of physics.

It is believed that the possibility of moving back in time, to the beginning of the life of the Universe $\boldsymbol{(t=0)}$, directly depends on our knowledge of the interaction of elementary particles at high densities and energies. Here cosmological problems are directly connected with microcosm physics.It is no accident that all dispositions of Big Bang scenarios are constructed approximately as follows: time

$t \approx 0,3$ sec, temperature ***$T \approx 3 \cdot 10^{10} K$***, density ***$D \approx 10^7$ g/cm^3*** (it is believed that starting with a density ***$D \approx 10^7$ g/cm^3***, neutrinos are detached from nucleons and almost survive until our days).

One gets acquainted with such a dashing reconnaissance and involuntarily wonders: well, what's next? As soon as we allow ourselves to rake all matter of the Universe in one fell swoop and make a grandiose cosmic commotion, after such a dizzying flight of fancy we should understand exactly what ordinary elementary particles, so to say, the most primitive pieces of matter, are. However, this is not the case. This is where the biggest difficulties begin. It's easy and careless to speculate about what happened to the universe billions of years ago (as they say, because of the passage of time and lack of witnesses), but it's much harder to figure out what's going on on your desk.

Frankly speaking, not a single scientist today is able to intelligibly explain what an ordinary electron is. What is its real physical entourage? After all, one cannot really deny the reality of the electron's objectification of its identity. With such helpless state of theoretical thought, as they say, within their own skin, to speak responsibly about some supercataclysms, that took place in Universe billions years ago, seems to be very, very premature. Of course, it is possible, even necessary, to work out all kinds of scenarios of world creation, but in this case we should not lose the sense of proportion. Is it possible to seriously speculate about modes of operation of all matter of the Universe, concentrated in a single mass, if it does not lead to an understanding of what elementary particles of matter, so to speak, primitive material formations, are like after the universe thistle has happened?

The biggest flaw of the Big Bang Theory is its blatant unproductivity. Nothing has ever come out of this theory and nothing has ever been derived from it. It is impossible to recall literally any physical idea, which science came to directly due to this concept. The red shift of spectral lines of light signal coming from distant galaxies was registered before the explosion theory. Relict radiation, too, was detected in a completely unexpected way and quite independently of the Big Bang concept. The famous formula: "the mountain gave birth to the mouse" — in fact, it is much more fruitful than the phantasmagorical scenario proposed by science for the origin of the universe. A global theory, especially one designed to interpret the greatest act of the "birth of the world", cannot exist as a "thing in itself" and "for its own sake". It must address the fundamental problems of modern natural science and offer a positive solution to them.

In particular, it would be very convincing if the theory of creation that we have adopted could effectively address one of the most universal and comprehensive physical interactions, which is called "universal gravitation". I would like the proposed scenario of the birth of the Universe to contain ideas that could be used to systematize the diverse and sometimes poorly coordinated experimental information from the microcosm, such as corpuscular — wave dualism. Of course, an adequate theory must contribute to overcoming the acute conceptual crisis that haunts the attestation of the fundamental categories of the universe. There is much more to be "got" from a full-fledged theory of the creation of the world.

The Big Bang hypothesis does not so much answer our questions as it actively helps to create them. What in principle is unacceptable for such a solid cosmological generalization. As a result, that unreachable pile-up of unanswered questions, which are looming in connection with the Big Bang, at all crosses out the cognitive value of interpretation of redshift of light signal coming from distant galaxies, through Doppler effect. It always happens, when one tries to explain complicated or not understandable things by arguments even more complicated or not understandable at all.

Meanwhile, as has been repeatedly noted, we have at our disposal a scripture proposed by the Holy Scriptures, which is capable, with the appropriate physical filling, of giving a maximally consistent and, most importantly, potentially fruitful picture of the functioning of the universe. From this picture we will naturally generate breakthrough ideas that will allow us to solve the pressing problems of modern natural science. In this case, we are naturally referring to the events of the first days of creation as described by Moses in "Genesis". When God created the earth and heaven as if from "nothing".

In relation to the four principal setting formulations, for the possible material attestation of the fundamental categories "space" and "matter", the biblical version of the creation of the world most accurately agrees with the fourth of the previously proposed variants. According to the latter, space and material objects of substance in it act as derivatives of the single material substratum. As different modifications of the mother space of the Universe, which can take all kinds of qualitatively-peculiar forms, depending on the peculiarities of the existing at the moment physical conditions.

Historical strata of human interaction with the outside world, all the accumulated practical experience have firmly fixed in our consciousness the division of the world into "emptiness" and "matter". In order to reconcile our perception of the surrounding world with the fourth statement, it is necessary to make some speculative effort and try to imagine the whole variety of the surrounding world as a manifestation of different physical states of the absolute mother space of the Universe.

Let's illustrate this position:

Imagine a homogeneous physical medium, let it be ordinary water, and let an ice ball the size of a soccer ball rest in this medium. Water, in our representation, will play the role of space, and the ice ball will play the role of substance. In its material content, the ice ball is a qualitatively peculiar form of the local area of the medium in which it exists. Both water and ice are ordinary water molecules. Only the difference of their temperature-energy levels, i.e. the qualitatively peculiar state of H_20, molecules, allows us to clearly separate these two forms of material formations.

Here, in fact, is an illustrative model illustrating the nature of the relationship between space and matter, according to the fourth principle setting, for the possible material attribution of the fundamental categories of the universe. This model satisfies the conditions of realization of the biblical version of the creation of the world as much as possible. According to which the spontaneous possibility of the emergence of matter from the mother material space, without the involvement of any additional creative means, is envisaged.

If we had to choose anew the names for the fundamental categories of the Universe, in accordance with the requirements of the Fourth Statutory Formulation, it would be reasonable to refer to the old Kant's precepts and to keep the definition "absolute space" proposed by him for the uterine space of the Universe. It should be emphasized that the physical state of matter of uterine space is taken as a zero normal. Then all other states of material space, which are deviations from this zero normal, should be called "relative space" and combine the manifested material world in the form of "field", "matter" and "time". Here you have a ready working platform for building a unified field theory. However, we, of course, will stick to historically established names for the fundamental categories of the Universe, bearing in mind that all of them are the expression of different states of the mother matter of the Universe's absolute space.

An extremely important, irreplaceable merit of the fourth setting formulation, which considers space and matter in it as derived from a single mother matter, is its maximum tendency to evolve. This setting assumes the objective possibility of the emergence of massive material objects of matter directly from the spatial substrate. Substance, in this case, can appear in any region of space and leave into nothingness in a quiet enough and accessible to our understanding way, akin to formation and melting of ice. And then there is no need to invent noisy illuminations like the Big Bang. Significantly, in the context of the fourth principled setting, the holy Good News of the Evangelist John, which opens with the majestic verses: "In the beginning was the Word, and the Word was with God, and the Word was God" (John 1:1), — acquires a much deeper and more fruitful cognitive meaning than other deeply scientific reconsiderations.

In fact, in the verses of the Evangelist John, the expression "Word" — aka "Logos" — is marked by a particularly sublime, hypostatic meaning. It is no coincidence that this key biblical definition is written with a capital letter. In accordance with the fourth principle setting formulation, about the possible physical attestation of the categories "space" and "substance", the emergence of substance with the help of the Providential "Word" can be interpreted as a large-scale crystallization of substance from the mother material substrate at the command of the supreme universal will. Emissaries of the highest universal will can be seed crystals, i.e. "Logos", as well as any elementary particle of the substance, possessing the rest mass. The presence of the latter in the mother material space will remove it from the equilibrium state and provoke the beginning of wide crystallization reaction. That, in its turn, should lead to formation of significant masses of matter: in the form of stars, planets and whole galactic systems. The process of crystallization of matter in concentrated media is well studied and quite accessible to our understanding.

Thus, we have every reason to assume that at the origins of the birth of our planet really was the "Word" and this idea itself is quite worthy of serious scientific attention. The statement of the Evangelist John that "In the beginning was the Word" is, of course, fully consistent with the Mosaic account of the first days of the creation of the world by the efforts of divine providence. This creation, as we know, took place according to the statute of the Hebrew word "bara", meaning to make from nothing. In the very act of the creation of "everything" out of "nothing" lies the guarantee of the infinite variety of forms of existence of the universe. For an objectified source material would inevitably limit the range of manifestation of the material world. In the universe constructed according to the theological scenario, there are actually no fixed forms of existence of material entities. In it there is a continuous process of transition of space into matter and, vice versa, conversion of matter into spatial matter.

Recall the model of the Universe according to the Big Bang scenario. For all its apparent dynamism, it is, in fact, extremely static. The only variable in it is the distance between cosmic masses of matter. The main components of the Universe, i.e. its embodied component, are present in the Big Bang theory in once-defined stationary forms. In a word, it is a frankly mechanistic model with a clear accent towards the Democritical division of the world into two primordials — matter-matter and space-void.

The scientific optimism of the Big Bang theory is based on the belief that nature is a naturalized fulfillment of some logical scheme operating in the mode of sequential realization of cause-effect relations. When from the state of a physical system at some point in time follows unambiguously all its other states in the future. This theory has projected on itself a rather archaic, alternative-free logic of semantic determinism. We are used to interpreting any events as inevitably necessary and fully subject to the dialectical law of cause and effect. As if such connections alone can reflect the objective laws by which the universe evolves.

Meanwhile, we know for a fact that the laws of nature are not causal; on the contrary, they are mostly statistical in nature. In the external world around us there is a continuous change in the probabilities of possible states. Therefore, there is no sense and no need to talk about strict causal, unambiguously defined relations, on the basis of which supporters of the Big Bang theory advance to the early stages of the existence of the Universe.

In fact, we do not need to know at all why in any region of cosmic space an unstable state of matter matter matter may arise and large-scale crystallization of matter will begin. It is much more important for us to learn to accept the very possibility of the emergence of matter from the matter matter of space, which constantly balances on the mark of probably possible beginning of large-scale crystallization of matter or, on the contrary, conversion of matter into spatial matter. Although for very persistent atheists and determinism supporters it is possible to give a consoling assumption that intertransformation between space and matter occurs due to continuous movement of galactic masses. In this case the mechanism of nullification for symmetric distribution of matter masses in the cosmic space is triggered.

The possibility of spontaneous, spontaneous emergence of matter from the mother matter of space allows us to come to a stable agreement between the biblical and scientific version of the creation of the world. This is first. Secondly, the reduction of space and matter to a single material substance makes it possible to lead natural science out of a complex conceptual crisis, which has haunted the attribution of the fundamental categories of the universe for many years. Finally, we have an excellent opportunity to start building a universal "grand unification theory" that would naturally consolidate all kinds of physical interactions.

3. WHAT IS THE PERSONAL SPACE-TIME CONTINUUM

We have already pointed out that the properties of the space-time framework and the properties of the substance, i.e. the material stuffing, must be closely interrelated and interdependent with each other. If we carefully analyze the biblical scenario of the creation of the world, which in the previous section we filled with adequate physical content, we can easily find out that this scenario is permeated by an organic connection between the space-time frame and the substance present in it. Because these fundamental categories are based on a common material platform. The closed physical system "water — ice" vividly illustrates such organic unity of the common material platform for the fundamental categories of the Universe.

In fact, the biblical version of the origin of the universe provides us with a unique opportunity to realize the coveted fusion of relativity theory with quantum physics. Einstein's theory of relativity, in fact, is a conceptual assumption, describing supposed metric topology of space-time framework, and quantum theory is a conceptual assumption, describing supposed physical properties of matter. Moreover, quantum theory copes with its tasks perfectly well, even without resorting to Einstein's spacetime topology. If in our theoretical constructions we can base properties of space-time frame and properties of material stuffing on common material platform, this circumstance will serve as a starting guiding idea for construction of unified field theory or, as it is also called, "big unification theory".

The assumption that there must be some universal material substance behind the fundamental category "space" is, of course, not stunning news. It was first substantively thought about when the wave signatures of light were discovered. The realization of wave processes, in its most general form, implies the presence of some physical system or medium capable of coming to a state of wave perturbation and carrying energy on itself. In accordance with these concepts, the wave features of light, most naturally explained by the existence of a special kind of light-carrying ether, which is an expression of some properties of material space, which provides the process of propagation of light waves. For a long time the idea of light-carrying ether had a firm place in theoretical reasoning, and it seemed that it remained only to consolidate the priority of this hypothesis with reliable experimental observations. Various, most often rather clumsy, models of "gaseous" or "jelly-like" state of ether were put forward, which corresponded to longitudinal or transverse character of origin of light waves.

We are well aware that the idea of light-bearing ether gives physical space the quality of objective reality, which must be observable and registerable along with material objects of matter. In this case, motion should be regarded not only as an observable movement of material objects relative to each other, but also as a controllable movement of substance objects relative to physical space, acting as a light-bearing medium. In this situation, it is quite natural to consider the material space as an absolute stationary frame of reference, with respect to which it is fair to carry out all kinds of measurements and observations. At the end of the last century no one doubted, including the experimental physicists Michelson and Morley, that the Earth instruments should register the speed of our planet (in its orbit around the Sun), which appears as the speed of movement relative to the light-carrying space.

As adherents of the idea of light-carrying ether, these inquisitive scientists endowed absolute space with some hypothetical properties that allow space to come to a state of wave perturbation and carry energy on itself. From which it inevitably followed that the speed of passage of the light signal at the surface of the Earth must be unequal in different directions and depend on the orientation of the planet's flight in absolute light-carrying space. In other words, the simple rule of addition of velocities, which takes into account the speed of light propagation in the hypothetical ether and the speed of the flight of our planet relative to the light-carrying space must be fulfilled. It was expected that as a result of comparing the sums of these velocities, in different directions, it will be possible to derive the absolute speed of the Earth's flight relative to the global space of the Universe.

When Michelson and Morley decided to conduct their famous experiments to detect the etheric wind effect, they must have been encouraged in no small measure by the success of Foucault's experiments. These experiments made it possible to observe the rotation of the Earth around its axis by laboratory means. If it was possible to register the results of such a rotation with terrestrial instruments, it seemed quite natural to observe the motion of our planet relative to absolute light-bearing space, which appears as a universal reference system. Keeping in mind that the Earth orbits the Sun at a speed of about thirty kilometers per second.

Scientists brilliantly prepared and performed a series of witty experiments that seemed to register the presence of the etheric wind. How great was the disappointment of the naturalists when their instruments refused to produce the expected results. The speed of light signals in all directions remained unchanged. As if the Earth maintains a state of rest relative to the light ether and there is not the slightest sign of the implementation of the rule of addition of velocities.

Negative results of experiments on registration of ether wind effect led scientific thought in deep confusion. It was too urgently required to introduce into the scientific circulation the presence of active spatial medium, capable to perform the function of wave energy transfer (in the light of more and more clearly manifested wave nature of microcosm physics). And of course, very much wanted to have a reliable coordinate reference system connected with the world spatial and temporal frame. A universal frame of reference, against which it would be convenient to unfold a fascinating picture of the surrounding world, from any point of the Universe. However, the insurmountable logic of the experimental data results hindered in every way the fulfillment of these, as it seemed, quite reasonable expectations.

The situation, however, demanded the acceptance of some reasonably acceptable explanation. After all, the negative results of experiments — are also a kind of bottom line and, like any bottom line, they need appropriate authoritative comments. It must be said that we sometimes err in extolling the role of experiment in science. The truly decisive decisions are not made by experiments as such, but by their explanatory accompaniments. And here, as everywhere else in human activity, there are interested parties. The same experimental results can be arbitrarily interpreted in a way that is convenient to one's worldview and meets one's subjective creative aspirations. The latter was fully demonstrated in the debate on the results of the Michelson-Morley experiments.

In this connection let's ask a question: on what basis Albert Einstein, on the results of the experiments which have not confirmed presence of ether wind, has made the categorical statement — as if no luminiferous ether in the nature does not exist and should not be? After all, such a conclusion, in fact, is not so indisputable, as it may seem at first glance. Michelson and Morley set themselves the specific task of trying to register the ether wind effect. The experiments, as it turned out, yielded negative results. That is, they categorically testified that no ether wind at the surface of our planet is not observed. Here, in fact, what are and what are limited really indisputable conclusions on the results of the commented experiments.

Einstein, however, arbitrarily develops this position and makes a step that is not flawless from a logical point of view. He states that if there is no etheric wind, there is and can be no luminiferous ether. Formally, in this case worked a vicious practice, when the well-known principle: "if the facts against us, so much the worse for the facts".

In fact, let's think, why does Einstein so inextricably link the existence of light-bearing ether and the etheric wind effect? After all, these, quite independent physical data can actually have an independent expression. In itself, the idea of the existence of a light-bearing ether does not have to lead unambiguously to the ether wind effect. We know that two fundamental conditions must be strictly met for the ether wind effect to occur. First, the presence of light-bearing ether and, second, the presence of the velocity of the Earth relative to light-bearing space. Failure to meet either of the two prerequisites will lead to negative results of experiments to detect the etheric wind.

Einstein built his reasoning in the most uncomplicated way, as if lying on the surface. He came to the conclusion that the etheric wind cannot be registered for the absence of a luminiferous ether, and declared this position as a non-alternative reality, on which he built his theory of relative motion. And to avoid pesky uncomfortable questions, the scientist declared the constancy of the speed of light in any inertial frame of reference. This was done in the form of a postulate, i.e. without any attempts to provide any theoretical support. Therefore, the light postulates have become the most incomprehensible of a number of difficult to comprehend aspects of the theory of relativity. Even if we do not question the physical content of the light postulates, we can never come to terms with the total lack of understanding of their actual origin. After all, without intelligible answers to the sacred questions "how?" and "why?" any process of cognition cannot be considered complete.

Meanwhile, another version of the explanation of the negative results of the Michelson-Morley experiments, which has not been properly developed, is still relevant. The fatal mistake of the authors of the experiments on the detection of the etheric wind was blindly tying the speed of the Earth's flight along its orbit around the Sun to the speed of our planet's flight relative to the luminiferous space. The alternative version of interpretation of negative results of the well-known experiments is formulated as follows: the etheric wind is not registered because the necessary speed of the Earth's flight relative to light-bearing space is absent. That is, the second of the two necessary conditions for registration of the etheric wind effect, stipulated above, is not fulfilled.

If our planet is actually barreling around the Sun with a certain speed, it does not directly follow that it moves relative to the luminiferous ether with the same speed. In order for the statement — "The Earth flies relative to the light-bearing ether at a speed of thirty kilometers per second" to have a real physical meaning, we must be able to show that the metric structure of the Earth's light-bearing ether is rigidly bound to the solar mass. Without fulfilling this fundamental requirement, any experiments to detect the effect of the etheric wind on the surface of planet Earth cannot and should not lead to positive results.

In fact, we do not have any scientifically valid arguments to absolutize the solar mass and consider it as a privileged material object in the Universe, with which only the light ether metric is related. Consequently, there is no positive reason to link the speed of our planet's orbit around the Sun with the speed of the Earth's flight relative to the light-bearing space.

To be fair, it should be noted that attempts to eliminate the factor of the flight of our planet relative to the luminiferous space in theoretical physics took place. As a rule, it was connected with the idea of gravitational binding of the light-bearing ether to the mass of our planet. It was assumed that the Earth during the flight in absolute space entrains with itself the spatial light-bearing shell, just as it entrains in its movement the shell of the atmosphere. Obviously, such an extravagant approach really eliminates the factor of Earth movement relative to the luminiferous ether and allows to develop a counter-Einsteinian interpretation of the results of the Michelson-Morley experiments. The fundamental weakness of this idea lies in a variety of "technical" difficulties arising in connection with the implementation of the model of a suitable luminiferous ether, capable of moving relative to absolute space together with the mass of our planet.

Nevertheless, the very theoretical attitude to shift accents from the light-bearing ether tied to the solar mass in favor of personally oriented, organically connected with the Earth mass light-bearing space is in good agreement with Einstein's light postulates. In fact, nothing prohibits to assume that our planet is present and interacts with the absolute material space of the Universe in such a way that the Earth has its own personally oriented light-carrying space. It is the presence of personal, metrically related to the center of mass of our planet four-dimensional space-time that ensures the fulfillment of the light postulates and prevents the ether wind effect.

If to make this statement universal and to declare that not only the Earth but also each material object possessing mass of rest has its personal light-bearing space-time in the Universe, then the law of constancy of light velocity in emptiness becomes obligatory for the observer connected with any massive body of readout. Then the same beam of light for observers moving with their devices relative to each other will have the same speed in all directions.

As we can see, the idea of the existence of a personal light-bearing ether agrees perfectly with Einstein's light postulates, although contrary to the categorical statements of the author of relativity theory, who proclaimed the unacceptability of the presence of light-bearing ether at the surface of the Earth.

Certainly, to fill the idea defending existence of personal light-bearing space-time, adequate physical content and to develop it to fundamental, including mathematical, consequences is much more difficult, than the way chosen by Einstein to deny the light-bearing ether. At all that we strongly emphasize that repeatedly confirmed results of experiments on detection of the ether wind effect, in principle, allow to develop the counter-Einstein theory of relative motion, not entering into contradiction with existence of light-carrying space. Below we will demonstrate that such theory of relative motion, defending presence of personally oriented light-bearing space-time, promotes further development of key relativistic principles and allows to involve quantum laws.

So, we understand that at the time of the construction of the special theory of relativity, designed to describe the inertial state of physical systems, around the conceptual attestation of the category "space" there was an extremely contradictory situation, due to the negative results of the Michelson-Morley experiments. On the one hand, the experiments clearly recorded that no ether wind effect near the Earth's surface is observed. On the other hand, the same experiments clearly pointed to the belonging of the near-Earth space to the observed metric, hence material, structure. Since the investigated space was objectively registerable, it had a set of specific physical properties. The latter were succinctly formulated by Einstein in his light postulates.

It should be clear that outside of material attribution the light postulates look like intellectual ghosts, so we just have to attribute the near-Earth space equipped with light postulates to the material structural formation with registerable physical properties. As a result, a very responsible dilemma lined up — whether the idea of a light-bearing ether should have been abandoned, or whether a physical formation that combined seemingly mutually exclusive abilities should have been chosen for near-Earth space. Because the near-Earth space imagined by us must function in the mode of light postulates and, therefore, lend itself to material attestation. At the same time, the near-Earth space that we theoretically recreate should exclude the etheric wind effect.

In this extremely contradictory environment, Einstein, as we know, did not take the path of finding a full-fledged conceptual equivalent for near-Earth space, satisfying the results of the Michelson-Morley experiments. He decided to simplify the situation by abandoning the very idea of the existence of light-bearing space-time. However, by abandoning the idea of light-bearing ether and not offering in its place any equally acceptable alternative for an adequate physical attestation of near-Earth space, the author of relativity put himself in an extremely difficult situation. He had nothing to do but to transfer the solution of this, primarily physical, question to the geometrical plane.

The scientist threw a four-dimensional coordinate grid on the near-Earth space and began to use it as a world space-time framework, against which he unfolded a picture of the world around. And to make the geometric coordinate system acquire the status of objective reality, Einstein had to take an unprecedented step. He endowed the metric structure with physical properties, which were compactly formulated in the light postulates. Of course, we must commend the determination of the scientist, who risked to elevate the metric structure to the rank of physical reality, but it is necessary to be aware that such a situation is not the norm.

Replacing physical realities with mathematical constructions is undoubtedly a forced procedure, requiring a persistent search for the real physical essence behind these abstract combinations of artificial symbols, especially in solving fundamental problems. Here there is always a latent danger of relegating our knowledge to the realm of arbitrary virtual maxims. We should naturally hope that the mathematical laws we deduce reflect the real state of affairs in the world around us and can act as logical corollaries derived from observable physical phenomena. But under no circumstances should mathematical constructions act as the very causes of objective physical properties. Because two apples plus two apples would, of course, be four apples. But in order to combine four apples, certain work has to be done, related, for example, to overcoming inertia. The apples themselves on the command "two plus two" jump only in the circus.

There is no doubt that any physical idea claiming to correspond to objective reality must be reduced to mathematical consequences. Mathematical equations, for all their abstractness, have an inner logical rigor. In interaction with conceptual formulations, they control the purity of our theoretical constructions from possible logical arbitrariness. Meanwhile, this provision should not take the form of the opposite dependence, when mathematical constructions are elevated to the rank of physical arguments. This methodology of consciously "stretching" mathematical structures to the level of objective physical realities is undoubtedly a forced procedure. It is a direct consequence of the lack of a conceptual arsenal involved in modern theoretical treatment.

The explicit presentation of geometrical constructions and their further development up to the level of physical arguments are well seen in the ideological facture of the whole theory of relativity. This is the case with the accompaniment of four-dimensional coordinate grids by light postulates, so it happens in the general theory of relativity, when pseudo-Riemannian space-time geometry is elevated to the rank of the gravitational field. What does this method give us?

Suppose that Einstein found a mathematical expression that allows us to consider space and time in a unified metric manifold. But it does not follow at all from this that the expression found is able to give us a meaningful idea of combining these deeply different physical categories. If formally, the equations of the special theory of relativity do not raise doubts, but, at the same time, they do not move us one iota towards understanding the physical nature of four-dimensional space-time, equipped with light postulates. This is because Einstein based his theoretical generalizations on geometrical constructions of frankly mental origin. While initially it would be necessary to present an adequate conceptual physical context, and then develop it to the desired topological consequences.

Of course, the scale and level of Einstein's creative efforts are such that he could not afford to make any statements out of carelessness or understatement. However, we will allow ourselves to point out the lack of proper correlation between the mathematical equations of the theory of relativity and the logic of the conceptual arsenal engaged by the author of this outstanding theory.

As we know, the key equation of the special theory of relativity, in its most general form, is written as follows:

$$S^2 = (ct)^2 - (x^2 + y^2 + z^2) \tag{3.1}$$

It is believed that the origin of equation **(3.1)** is due to the existence of four-dimensional space-time coordinate systems. Such coordinate systems arise as a result of coupling of three Euclidean spatial coordinate axes with one more the fourth, temporal dimension. A geometry in which the distance between two points is determined using equation **(3.1)** is called Minkowski geometry. Minkowski geometry is an expression of a combined space-time topology, because along with spatial distances it includes intervals of time. That is why it is considered that the theory of relativity is a theory of motion of material objects in four-dimensional space-time, in contrast to Newtonian mechanics, which describes motion in space and time taken separately.

Obviously, the right-hand side of equation **(3.1)** is composed of two significantly autonomous physical arguments. Usually, the first argument of the right-hand side of this equation, i.e. $(ct)^2$, is identified with the time coordinate axis. The second argument, respectively $(x^2 + y^2 + z^2)$, is identified with the set of three spatial dimensions in a rectangular system of coordinate axes. The difference of these two terms-arguments gives the solution for some four-dimensional space-time interval S^2, enclosed between two control points on the trajectory of the test body.

In their overwhelming majority, scientists dashingly link the expression $(ct)^2$ with the fourth, temporal dimension. The more cautious ones call $(ct)^2$ "the imaginary temporal coordinate axis". Here, of course, the key definition is the cute word "imaginary", which bashfully hides some uncertainty.

Meanwhile, if we focus our attention and analyze the structure of the argument $(ct)^2$ in the Minkowski equation in an unbiased way, it is easy to conclude that the dimensionality of this argument should be: $m \cdot sec/sec.$. It should be emphasized that the general philosophical and physical facture of the theory of relativity does not seem to allow a fair reduction in the dimensionality of sec/sec. As a result, we would take time out of the equation and lose the opportunity to talk about the spacetime interval S^2. As we grasp the metric structure of the Minkowski equation, a fair assumption arises that this expression should never be referred only to the coordinate dimension. The coordinate axis, strictly speaking, can be a sequential series of points in space or moments in time. The dimensionality of $(ct)^2$ is such that it is most natural and quite natural to consider this argument as some previously undefined three-dimensional function which unfolds in the corresponding three-dimensional coordinate system bearing on its axes the metric notations ***m,sec,sec***.

The degree of our penetration into the physical essence of expression $(ct)^2$ cannot be overestimated, since the whole relativistic essence of Einstein's theory of relative motion is concentrated exactly in this argument. When we identify this argument with only one coordinate axis and call it "the fourth coordinate", a very unfortunate inaccuracy is allowed. Of course, we can call anything and any way we want, but we must strive to operate with definitions that reflect the real nature of the phenomena under study. In this sense, all clumsy reasoning about the "fourth" or "imaginary" coordinate axis in the equations of relativity theory seems to be completely unsatisfactory.

In order to agree with the one-dimensional interpretation of the topology of argument $(ct)^2$, one should at least try to find an explanation for the three-dimensionality of this exotic coordinate dimension. And if, however, following unbiased logic, one agrees with the obvious three-dimensionality of the topological structure of expression $(ct)^2$, one should try to find out what is really behind this mysterious argument of the famous Herman Minkowski equation.

It so happened that the theory of relativity did not develop along the way of adequate reading of true topology of expression $(ct)^2$ and, consequently, adequate reading of true metrics and, as a consequence, physical meaning of the whole equality **(3.1)**. We continue to use this equation, taking it as a mathematical tool to define some interval in a geometric four-dimensional manifold. However, all attempts to represent the world geodesic line in Einstein's four-dimensional space-time, to represent it figuratively or graphically, have never been successful.

It is hardly necessary to convince anyone that the absence of a clear idea of the true topology of the mathematical toolkit we use significantly limits its cognitive value. Thus the traditional, one-dimensional treatment of the metric structure of the argument $(ct)^2$ is not just logically imperfect. The reading of the Minkowski equation in this topological expression undoubtedly hinders the further development of relativity theory itself. Moreover, it testifies, quite unambiguously, about the serious inconsistency of the conceptual arsenal involved in Einstein's theoretical usage. And the problem here is not in limitedness, imperfection of human imagination, as some advanced researchers say. The problem, first of all, is the conceptual inconsistency of the conceptual arsenal used in describing the results of relative motion.

When Einstein began to build the general theory of relativity, designed to interpret irregular motion, and at the same time to solve the problem of gravitational interactions, it turned out that the nature of the universal gravitation was even more closely connected with the geometrical properties of space-time. Such a connection, with all conviction, appeared in the principle of equivalence, establishing the complete identity of inert and gravitational masses. The decisive assumption of the existence of curved space-time, accepted by venerable scientists, made it extremely difficult to find an adequate physical equivalent for the undoubted objective reality having the name "gravitational field". It became simply inconvenient to be limited to mathematical coordinate grids only. After all, we were talking about global physical forces and interactions, behind which there simply must be some fundamental physical factor.

The lack of an adequate conceptual equivalent for the physical interpretation of the topology of four-dimensional space-time in the special theory and the frank helplessness in the matter of revealing the physical nature of the light postulates inevitably transformed to the conceptual context of the general theory of relativity. Here conceptual insufficiency turned into insurmountable obstacle in the question of establishment of real physical equivalent for the category "curved space-time". In these difficult circumstances, the author of the theory of relativity seemed most appropriate to resort to the idea of the existence of gravitational waves, a kind of ersatz of electromagnetic waves. The idea, in fact, only emphasized and exacerbated the inconsistency of Einstein's conceptual arsenal.

Indeed, there is a strange and completely unnecessary duality. If the curved four-dimensional space-time is an objective reality, designed to provide the universal gravitation, then what do gravitational waves have to do with it? On the other hand, if gravitational waves are an objective reality capable of causing universal gravitation, then what does a curved four-dimensional space-time have to do with it? It is this unstable ambiguity in the description of the nature of the universal gravitation that is a sure sign of the disadvantage of Einstein's ideas about the true physical essence of the gravitational interaction.

Such an ambiguous interpretation of the nature of gravitation, obviously, was due to the fact that the author of relativity theory's appeal to the services of pseudo-Riemannian geometry was not supported by adequate conceptual support. For us it did not become clear, with the help of which objective physical means the curvature of four-dimensional space-time is realized. Consequently, we still do not understand the nature of the origin of the metric tensor in the equations of general relativity.

It should be noted that the theory of relativity itself does not owe anything to gravitational waves. It works perfectly well without their existence. The problem is that a fundamental physical theory cannot be perfect if there is no reliable conceptual basis under it. Thus, behind the phrase "curved four-dimensional space-time" there must be not just a geometric manifold, but also a really working physical factor. You can not, in fact, with full seriousness argue about some curved void. The lack of a full-fledged semantic equivalent for curved space-time provoked the author of relativity theory to search for additional conceptual tools that could fill the functional insufficiency of his theoretical arsenal. It seemed to Einstein that such auxiliary means could be gravitational waves, the unsuccessful search for which continues to this day.

It seems that Albert Einstein, having proclaimed the curved space-time as a physical reality, was surprised by his discovery and, as if doubting it, urgently began to invent gravitational waves in order to preserve the traditional similarity of the electromagnetic theory for his general theory of relativity. After all, the appeal to the services of gravitational waves is nothing but a direct throwback to the Lorentzian standards in determining the conceptual status of the category "space".

Lorentz believed that between the material particles carriers of electric charges there is empty space, in which the electromagnetic field is able to propagate. The electromagnetic field may or may not be in empty space, but empty space is always there. It can be filled or emptied by the electromagnetic field, in full accordance with the Kantian definition of absolute and relative space. The only difference is that relative space became known as a field. The same double standard syndrome is well seen behind the idea of existence of gravitational waves. The idea of heavy masses acting as carriers of gravitational charges and a wider empty space in which gravitational waves emanating from these charges can propagate. Whichever angle you look at it, but the hypothesis of the existence of gravitational waves clearly parodies the electromagnetic theory, which assumes the existence of two spatial planes — absolute and relative.

By the way, the behavior of the pendulum in Foucault's experiments completely discredits the idea of the existence of gravitational waves, by analogy with electromagnetic waves. We know that when an electromagnetic field source rotates around its axis, the force field emanating from it rotates along with the mass of the generating source. So the gravitational field of the Earth, similar to the electromagnetic field, should rotate together with the mass of the planet. However, the behavior of the Foucault pendulum testifies to the opposite. Experiments indicate that the Earth does rotate around its axis, but this does not rotate the gravitational field. If the gravitational field were rotating together with the Earth's mass, then the trajectory of the Foucault pendulum would remain unchanged relative to the surface of our planet. It inevitably follows that the nature of the gravitational field has nothing to do with the nature of the electromagnetic field.

So, as a preliminary summing up, it is necessary to admit that the "Achilles' heel" for the theory of relativity remains the physical insufficiency of its conceptual space-time arguments. The basic categories of the universe represented by a set of metric coordinates-signs are too abstract, frankly detached from real physical representations. Moreover, it is rather unfortunate about the binding to a single coordinate axis of the argument $(ct)^2$, which is a reference point of the key relativistic equations of motion.

One should not rush to the conclusion that this theoretical study, which defends the biblical version of the creation of the world, aims to replace or reject the theory of relativity altogether. The main direction of development of this research lies exclusively in the ways of deepening the relativistic theory of motion. However not at the expense of complication of its mathematical solutions, when more and more sophisticated geometrical manifolds leading to construction of more complex coordinate systems are unfolded. This process, in fact, has no limits. If desired, it is always possible to find the desired trajectory of motion that does not unfold on an already known class of coordinate systems, which entails the emergence of new metric spatio-temporal manifolds. We associate a positive prospect for the development of the theory of relative motion with the work on its key equation **(3.1)**.

Looking ahead, we can announce that we will consider the famous Herman Minkowski equation **(3.1)** in a signature that allows us to represent the reference term of this equality, i.e. $(ct)^2$, as a three-dimensional wave function corresponding to the dimensionality of the argument. In contrast to the accepted, as it seems to us, absolutely unacceptable identification of the metric structure $(ct)^2$ with the coordinate axis alone. And let's do it not in the traditional manner, when it is proposed to blindly complicate the space-time topology of relativity theory in the signature $(4 + N)$. Where 4 is the four-dimensional coordinate system of relativity theory and N additional coordinate dimensions. We will present the topological structure of equation **(3.1)** in a signature completely amenable to analytical interpretation and satisfying the dimensionality of all terms-arguments involved in this equality. This, in the end, will allow us to introduce quantum regularities into relativity theory and radically expand its cognitive possibilities.

Beginning the presentation of the present, quantum-relativistic theory of relative motion, we will adhere to the historical context in relation to the formation of the current ideas about the kinematics of motion. Therefore, we will begin to structure our reasoning with an analysis of the results of experiments on the detection of the etheric wind. It seems to us that to the unconditional conclusions of the results of these experiments can be included indicating that the near-Earth space belongs to a material structure with objectively registerable physical properties. If space bears a specific physical load (which is unambiguously indicated by Einstein's light postulates), then such space by definition is accepted as material. Here we adhere to the firm conviction that observability, in principle, means materiality. Thus, it follows directly from the results of the experiments to detect the etheric wind effect that space in these experiments appears as an objective material reality, observable, along with material objects of matter.

As soon as space manifests itself as a certain material given, we are faced with the problem of establishing the nature of the relationship between such space and matter. This relationship must obviously be different from the Democritan presence of matter in emptiness. First and foremost, we must learn to distinguish substance from space. Learn to distinguish between these material formations. In the previous chapter we demonstrated the supposed nature of the relationship between space and substance on the example of the closed physical system "water — ice".

Further, it is necessary to construct a very special theory of kinematics of motion that allows these two material categories to interact effectively and inconsistently in the course of realization of relative velocity. After all, it is one thing when objects of matter move in empty Democritic space, and quite another — thing when motion is realized in a material medium. Suppose that inertial motion, which implies the direct transfer of matter from one region of space to another, faces well-known difficulties in the new situation. Accordingly, the quality of the whole set of physical laws governing the development of the universe must be adjusted to the conditions of the nature of the relationship between material space and the same material substance.

As it was already noted, according to the accepted by us principal installation, for material attestation of fundamental categories of the Universe, the relationship between space and matter is quite clearly illustrated by the closed physical system "water — ice". Water, just like ice, in its material content consists of a huge number of ordinary molecules $\boldsymbol{H_2 0}$. Only the difference of temperature, i.e. energy levels between water molecules allows us to draw a clear distinction separating these two kinds of material formations.

Drawing an analogy for "space" and "matter", it is natural to assume that the existence of elementary particles of matter in outer space is also conditioned by the dispersion of energy levels between the matter belonging to the control microparticle and the mother matter of space. If we liberate the matter particle from the energy $\boldsymbol{E = mc^2}$, the matter belonging to the elementary particle will be at the same energy level with the mother matter of space. The microparticle will as if turn into spatial matter. Just as the melted ice turns into water.

Returning to the ice ball resting in water, we note that the isolated physical system "water — ice" belongs to the category of unstable systems. After all, after a certain period of time, the ice ball will melt (assuming a sufficiently large mass and high temperature of water). The transformation of ice into water indicates an increase in entropy, the desire of the closed physical system "water — ice" to an equilibrium state, in which further energy exchange is no longer possible.

Accordingly, the closed physical system "space - microparticle" must be unstable. The elementary particle must dissipate the energy conditioning its very existence in the matter of space. This is also an expression of the natural aspiration of the isolated physical system "space - microparticle" to the equilibrium state, at which further energy exchange will be impossible. Dissipation of own energy by an elementary particle in the matter of space can be performed by expansion of the microparticle in all directions from its center. The elementary particle must constantly grow as if growing, like a uniformly inflating ball, in aspiration to "blur" and to be at the same energy level with the mother matter of space.

According to Newton's laws, the actions of two material points on each other are numerically equal and directed in opposite directions. In this case, if an elementary particle expands in all directions from its center with a certain speed, the material space, on its part, begins to move toward the center of the microparticle with the same speed. The particle tends to dissipate in space, but backward movement of matter matter compensates this dissipation and controls the outer shell of the object in a stable state.

Thus, before us opens extraordinary dynamic, hitherto unknown panorama of microcosm physics, when elementary particles of matter are present in cosmic space of the Universe as astrophysical black holes and absorb into their limits the surrounding material space. Of course, and any control mass of matter, consisting of a large set and variety of elementary particles, by the very fact of its presence in the space of the Universe, absorbs the matter of matter space. In this sense, all massive bodies work in the space of the Universe as black holes — they continuously absorb the material space surrounding them.

Convincing evidence in favor of the fact that all matter conglomerate possessing a rest mass actively absorbs the matter of space is the cosmological redshift of spectral lines of the light signal coming from distant galaxies. If all massive bodies inhabiting the Universe absorb the material space around them, there must be a constant stretching of it. Then the distance between the two control points of space must steadily increase. The greater the distance between the two control points we subject to observation, the greater the speed with which they will disperse between themselves. As a result, although ours and the distant galaxies maintain a state of rest relative to each other, the light signals coming to us from distant cosmic objects pass through a constantly expanding material space. Not the Doppler effect, but precisely the process of space stretching, due to its absorption by massive material objects of matter, leads to the effect of shifting the spectral lines of the light signal coming from distant galaxies.

The speed at which the reference point of space rushes to the limits of the mass of the object under study, due to its absorption of mother matter, is determined by Newton's well-known expression:

$$\upsilon = \gamma^{«D»} \frac{M}{R^2} \tag{3.2}$$

With the only reservation that the dimensionality of the Newtonian gravitational constant is $/m^3, kg^{-1}, sec^{-2}/$, and the dimensionality of the constant with the stroke $\gamma^{«D»}$ in equation **(3.2)** is $/m^3, kg^{-1}, sec^{-1}/$.

To physically justify the origin of equation **(3.2)** let us demonstrate the logic of obtaining this equality without involving the Newtonian constant.

The scattering energy with which any elementary particle possessing a rest mass tends as if to dissolve in utero space, akin to ice melting, is characterized by a constant value and bears a quantum value:

$$E\Delta t = \pi h \tag{3.3}$$

where $E\Delta t$ is the energy that an elementary particle dissipates in one second; πh is the product of pi by Planck's constant.

Let's rewrite **(3.3)** as:

$$mc\upsilon\Delta t = \pi h \tag{3.4}$$

Here m is the rest mass of the control microparticle; c is the speed of light in the vacuum; υ is the speed at which the elementary particle should expand in space. On the other hand, υ is the speed at which the mother matter intrudes into the limits of the classical radius of the observed microparticle, thus keeping it in a steady state; Δt is one second.

Based on **(3.4)**, we determine υ:

$$\upsilon = \frac{\pi h}{mc\Delta t} \tag{3.5}$$

In order to establish the speed with which the uterine space invades the limits of a material object having a considerable mass of matter and consisting of a large number and variety of elementary particles it is necessary to substitute in the right part of equation **(3.5)** the ratio of proportions which consists of mass and the square of radius of the object under study (M/R^2) with respect to mass and the square of classical radius of some elementary particle (m/r^2). Let such an accepted particle be an electron. Then:

$$\upsilon = \frac{\pi h r^2 M}{m^2 c \Delta t R^2} \tag{3.6}$$

If you take all the constants out of the right-hand side of equation **(3.6)**, their solution will give a value equal in magnitude to the Newtonian gravitational constant with a dashed $\gamma^{«D»}$.

$$\gamma^{«D»} = \frac{\pi h r^2}{m^2 c \Delta t} \tag{3.7}$$

Consequently, after an appropriate simplification, **(3.6)** can be rewritten as **(3.2)**:

$$\upsilon = \frac{\pi h r^2 M}{m^2 c \Delta t R^2} = \gamma^{«D»} \frac{M}{R^2} \tag{3.8}$$

Attraction of the classical radius of an elementary particle to our equations requires a separate remark. Thus, the classical radius of the electron is not considered in the proposed solutions as a value characterizing its absolute dimensions. After all, no one identifies the radius of the Earth with the absolute volume occupied by the substance of the planet in outer space. Under different conditions, the substance forming the mass of the planet can be concentrated more or less compactly. Say, from the density of a neutron star to a gas cloud. The detectable radius of an observable space object will vary over a similarly wide range. We use the classical radius for the electron, assuming that its value, according to scale invariance, is derived at the scale level of the quantities involved in equation **(3.6)** and satisfies their solution.

Let in reality elementary particles (including the electron) have a complex internal structure — at the quark or even finer level. This in no way affects the relevance of our solutions. Since the action of the proposed equation extends only beyond the classical radius of the studied objects.

It should be noted that the above equations allow one to overcome the classical boundaries and penetrate into finer structures. For example, to determine the so-called "critical radius" of elementary particles of matter. Speaking about critical radius we mean such a value, at which the speed of invasion of matter matter into limits of the investigated elementary particle will be characterized by the speed of light. Taking into account the fundamental importance of this velocity, it is very likely to assume that exactly at the level of the critical radius of elementary particles there is a real frontal opposition between the aspiration of a microparticle to scattering, on the one hand, and the return motion of matter matter space — on the other hand. In a sense, the critical radius of an elementary particle is an absolute value. In no circumstances it cannot be below this limiting value. The critical radius is determined by the equality **(3.5)**.

For this purpose, in the left part of equation **(3.5)** instead of $\boldsymbol{v}$ we substitute the speed of light $\boldsymbol{c}$. On the right side — we substitute the ratio of the square of the classical radius $\boldsymbol{r^2}$ to the square of the critical radius $\boldsymbol{r^2_{cr}}$. Then **(3.5)** takes the following form:

$$c = \frac{\pi h r^2}{m c \Delta t r^2_{cr}} \tag{3.9}$$

Then from **(3.9)** we find r_{cr}:

$$r_{cr} = \sqrt{\frac{\pi h r^2}{m c^2 \Delta t}} \tag{3.10}$$

The critical radius of elementary particles of matter seems to play an important limiting role at the edge of our ability to penetrate the depths of the microcosm. This radius delineates the micro-horizon of events beyond which physical reality remains forever closed to our direct observation. It is as if we are cut off from information containing the content of events unfolding within this horizon. Because the speed of intrusion of mother matter into the limits of a microparticle overlaps and completely neutralizes the speed of spreading of information coming from the depths of the controlling elementary particle of matter. Something similar, only on the scale of macrocosmos, happens to the expanding Universe. When the expansion rate of the Universe reaches and exceeds the light threshold, we find ourselves cut off from information coming from distant galaxies. So here, as is often the case, the opposing extremes are clashing.

Due to the fact that all massive material objects of matter are present in the Universe space as consumers of mother matter, we have a unique opportunity to build an extremely dynamic picture of the Universe functioning, which provides the surrounding world with continuous self-renewal. In the proposed, very favorable cosmological conditions the very possibility of existence of any fixed, once and for all predetermined forms of matter in space is excluded. And in the widest range — from the simplest elementary particles to the most complex galactic configurations. Essentially, here we find ourselves in a qualitatively different world, much more mobile and natural than it was in accordance with cosmological settings of the Big Bang theory.

But most importantly, in conditions of qualitatively updated ideas about the physical status of fundamental categories of the universe good prerequisites for modernization of our ideas about kinematics of relative motion arise. We have resource opportunities to find more expressive and mature theoretical support for relative velocity with stable quantum mathematical formulation.

So, we have stipulated that presence in the space of the Universe of representatives of many-faceted family of matter is provided by dispersion of energy levels between matter belonging to masses of matter and mother matter of space. Which, in its turn, is accompanied by absorption of material space by these, it is fair to say, very insatiable masses of matter. The exposition of absolute space in the role of mother material medium inevitably leads to the question about the motion of control masses of matter relative to such physically active space, which can perform the role of a universal reference system. Let us dwell on this rather non-trivial question and consider it in detail in a separate plan.

Traditionally, when imposing to the absolute material space the function of the universal reference frame, the following circumstance is missed. In itself, the uterine space, being a homogeneous and continuous medium, is not in principle able to work as a universal reference frame. The latter assumes the existence of reference points in relation to which all kinds of measurements and observations can be made. The assumption of a reference point in real space is carried out by giving it a specific physical load. Only in this way can a point be singled out in a general material medium. In this case, the point singled out with the help of physical load is supposed to be considered not as an element of absolute space but as an independent material object. And then any measurements attached to the isolated point have an actual meaning only in relation to it as an independent objective reality, but not to absolute space at all.

Before discussing motion in relation to absolute space, it is necessary to specify a procedure of marking that allows to select reference points in it, in relation to which all kinds of measurements can be made. At the same time, the marking procedure must preserve the state of the zero normal of the mother matter, i.e. not to destroy the state of continuity and homogeneity of space. Obviously, such requirements are unfeasible by definition. Therefore all debates about the registration of motion relative to absolute space, which appears as a universal frame of reference, seem senseless.

However, let us try to understand under what conditions the uterine space of the Universe can acquire the necessary topological properties to function as a full metric frame of reference, moreover supported by light postulates? In other words, we need to propose for consideration a physical state in which the uterine space becomes a metric structure capable of acting as a reliable coordinate system of reference. In this case, the metric background of such a coordinate system is always able to come to the state of wave perturbation and carry electromagnetic information with constant speed in all directions.

It is known that the main prerequisite for wave perturbation propagation is the presence of a stable physical system or medium carrying some regulated, equilibrium state in its structural memory. Removal of such system or medium from an equilibrium state by an impulse perturbation forces it to perform harmonic oscillations in an attempt to return to a former steady state.

The mother material space of the Universe itself is not that physical system or medium, in the structural memory of which any regulated, stable relations are embedded. It is an absolutely homogeneous, unlabeled medium, in which, due to the absence of stable structural connections, there is simply nothing to come to the state of wave perturbation. Therefore, any idea of imposing to the uterine space the function of light-bearing ether cannot be taken for serious consideration. Nevertheless, the question remains open: how do light waves propagate near the surface of our Earth and what is the role of uterine material space in this process?

If we solve equation **(3.2)** by substituting the value of $\boldsymbol{M}$ and $\boldsymbol{R}^2$

corresponding to the planet Earth, it turns out that the mother matter of space flows into the Earth's classical radius at a speed close to ***9,8 m/sec***. In fact, this means that all infinite space of the Universe is oriented to the Earth's center of mass and moves steadily towards it in accordance with the level **(3.2)**.

The displacement of the mother matter towards the Earth's center of mass gives space special topological properties of the objective reality capable of performing the metric function of the marked coordinate reference system. For each point of this, now already regulated, physical structure is supplied with a specific dynamic load. The removal of such a dynamically coordinated space from a given regulated state, say, by means of a light pulse perturbs its metric background, which just forces the space to come to the state of wave perturbation. Something similar happens with wave perturbations on the free surface of water as a result of falling of a stone on a calm mirror. Thus, we have every reason to consider the material space rushed to the center of the Earth's mass as a naturally marked coordinate reference system, capable to carry electromagnetic information and perform the duties of light-bearing ether.

All the aforesaid allows to make the first essentially important generalization: due to the fact that the Earth planet absorbs into its limits the mother matter of the Universe absolute space, it forms a so called "personal space-time continuum" (abbreviation **PS-TC**). Extremely important physical property of the Earth's **PS-TC** is its ability to come to the state of wave perturbation and carry on itself electromagnetic information with constant and equal in all directions velocity. When we state that the speed of light near the Earth's surface is equal to ***300 000 km/sec***, we must keep in mind that we are talking about the speed of propagation of light waves as if on the level of the light-bearing ordinar of the Earth's personal space-time continuum. The latter was safely recorded in the famous Michelson-Morley experiments. These witty experiments convincingly demonstrated the ability of the near-Earth space to come to the state of wave perturbation and perform light-carrying function. And to do all this in the mode of light postulates.

In contrast to the author of the theory of relativity, we do not simply declare the light postulates, but try to offer an exhaustive physical interpretation of the law of constancy of propagation of the speed of light near the surface of the Earth with the same speed in all directions. The most important advantage of the theoretical generalization proposed for consideration is its tendency to deeply rethink the categories of "space", "time" and "matter" in an inseparable relationship between them. It is not simply about a close geometrical interaction between personal space-time and matter, but about the principal impossibility of their separate, independent existence. Whereas in Einstein's conceptual arsenal the real physical interdependence between space-time and matter is actually absent. And consequently, there are no reliable prerequisites for unification of relativity theory with quantum laws.

In contrast to Einstein's four-dimensional space-time, the personal space-time continuum presented above is not an abstract geometrical structure, who knows by what right equipped with light postulates, but an objectively existing physical fact, which has accessible to our understanding properties. One of these pronounced organic properties is the light postulates, quite convincingly confirmed by the Michelson-Morley experiments. Critically, the physical nature of the personal space-time continuum is freely amenable to our rational comprehension. To this we should add that the terrestrial **PS-TC** can be used as a full-fledged space-time framework, on the background of which, or rather, on the level of the light-bearing ordinate of which it will be fair to make all sorts of measurements and observations.

If the three-dimensional Cartesian coordinate system is projected on the Earth's **PS-TC** so that the intersection point of the three coordinate axes falls on the Earth's mass center, the four-dimensional nature of our planet's personal continuum becomes quite clear. In the Earth's personal continuum, as a result of mother matter sliding along the spatial coordinate axes, three spatial dimensions and one temporal dimension are organically woven into a single metric fabric. Movement is just that one state when space and time enter into an indissoluble topological connection. As one can see, illustrating four-dimensional space-time does not require any puzzling extrapolations that are supposedly beyond our imagination. For this purpose it is necessary to have a clear idea of the subject itself and to be guided by the desire to master its natural physical essence.

Of course, not only the Earth, but any massive body has its own personal space-time continuum in the absolute space of the Universe. Dealing with a system of two or more massive bodies, any **PS-TC** can be successfully used as a world space-time framework, against which it is fair to make all kinds of measurements and observations. In this sense, all personal continua are equal among themselves and there is no privileged reference system among them. The decisive word in choosing a frame of reference, in each case, rests with the observer. It is the observer's location that determines the choice of personal space-time, at the level of the light-bearing ordinator of which the global picture of the outside world will unfold.

For example, for us, people living on planet Earth, all information about events occurring in the surrounding world comes and unfolds at the level of the light-bearing ordinar of Earth's personal space-time. This circumstance stipulates address orientation of the global picture of the outer world registered by an Earth observer. In particular, we should be fully aware that our planet's center of mass, being the starting point of Earth's **PS-TC**, quite naturally falls to the Earth observer as the center of the Universe as well. To the Earth's revolution around the Sun is possible only intellectually. It is not possible to record this motion by fixing the change in the speed of light near the Earth's surface, as the results of the Michelson-Morley experiments convincingly testify.

It means that our distant forefathers, believing that the world exists as we directly perceive it and that the Earth is the center of the universe, did not sin against the truth. The Earth, together with its personal space-time, really is for us the only and immutable world framework, against which any events that occur in the Universe are registered by earthmen.

Now is the time to recall the sacred Scriptures and turn to the prophet Moses. According to the book of "Genesis", the first day of the creative and formative acts of the divine universe is the creation of heaven, earth, and light. The narrative of the first day of the origins of the world ends with the words "the day is one". As is known, in the Hebrew original the phrase "one day" bears not so much an ordinal as a quantitative meaning. Therefore, all the information related to the first day of the creation of the world should be perceived as an inseparable creative and educational act. Here our common chronometric measure of a twenty-four-hour duration of an earthly day is inappropriate. The Bible does not say how long or short the first day of creation lasted. It is important to understand that everything occurring on that day must be seen as a cumulative one-act action, not allowing for the independent emergence of Heaven, Earth, or light in isolation.

The emergence of light on the first day of creation has repeatedly been criticized and has called into question the logic of divine Providence. According to the Mosaic account, the birth of the heavenly luminaries falls on the fourth day of creation, and this is explicitly stated in the verses devoted to the fourth day. A legitimate question then naturally arises: what kind of light is the holy Scripture talking about if all the heavenly lights were absent on the first day of creation? To suspect the prophet Moses of frivolity would be too naïve an undertaking.

In accordance with the logic of this theoretical study, we can assume that by telling the story of the emergence of Heaven, Earth and light on the first day of creation, the prophet states the simultaneous origin of Heaven, Earth and its personal space-time continuum, capable of carrying the light information on itself. The existence of the earthly **PS-TC** and its ability to work as a light-carrying medium is impossible without the presence of the earthly mass in the Universe. However, as well as it is impossible the existence of the Earth without its personal space-time, equipped with light postulates. These seemingly quite distinct material formations are completely interconnected and interdependent with each other. None of them assumes an autonomous presence in the universe, and this was known to the prophet Moses.

It is also written in the Bible that God separated light from darkness. That is, He created a personal light-carrying space-time environment out of the mother matter of absolute space (which plays the role of darkness due to its inability to carry light information on itself). If the Earth had been created without its personal space-time continuum it would have been unable to perceive any electromagnetic information from outside. And therefore it would be in isolation from the outside world, would exist, as they say, out of existence.

It would seem, how could Moses know about such peculiarities of functioning of the universe. But therein lies the great mystery, the divine inspiration of sacred Scripture. By the grace of God, the prophets were made aware of such intimate depths of existence, which we, at the cost of incredible effort, ask nature for in bits and pieces. One of these mysteries, which the prophets possessed, was the ability to perceive our earth and its personal light-bearing space-time as an inseparable physical system. In addition, the prophets understood precisely that the emergence of such a physical system in the womb space of the Universe was simultaneous, as implied by the wording "day one".

However, is it only Moses alone who narrates in sacred Scripture the mysteries of the passage of the luminous highways! Recall the book of Job, its 38th chapter. When the Almighty tests Job on his knowledge of the hidden springs that govern the life of the universe. In verse 19, the Lord directly asks Job, "Where is the way to the dwelling place of light, and where is the place of darkness?" The question posed to Job is quite legitimately paraphrased as: "What is the personal space-time continuum and what is the mother space of the universe?" Further down the text, in verse 24: "By what path does the light spill and the east wind spread over the earth?"

Let's think, isn't the question "Which way does light spill?" the central problem of Einstein's light postulates, which constitute the most inscrutable side of the theory of relativity? After all, it is one thing to declare that the speed of light is the same in any coordinate system and the same in all directions, in any region of a given coordinate system. But it is quite another thing to be able to give a physical justification for such a statement. Einstein in his theory of relativity does not even try to answer the questions arising from the light postulates. Although his entire worldview is built on the recognition of the immutability of the speed of light.

The factor of the constancy of the speed of light in the void (at first only in inertial coordinate systems) plays a key role in the theory of relativity and is as if its physical justification. There is no doubt that the success of the electromagnetic theory as edited by Maxwell and Lorentz inspired Einstein to believe in the truth of the statement that light propagates in space with a constant speed. The results of experiments revealing the etheric wind effect only strengthened this belief. Einstein's merit was that he extended as a principle the law of the constancy of the speed of light to all inertial reference systems, without a single exception.

Even before the theory of relativity, it was known that Maxwell's equations, and therefore the law of the constancy of the speed of light in the void, were invariant with respect to the Lorentz transformation. This allowed Einstein to conclude that the transition from one inertial reference system to another must also be carried out according to the Lorentz transformations applied to three spatial coordinates — X_1, X_2, X_3 — and one temporal one — X_4.

Further, based on the obvious requirement that the laws of physics must be the same in all inertial systems, Einstein found it possible to proclaim the invariance with respect to the Lorentz transformation of all physical equations expressing the general laws of nature. Thus, the content of the special theory of relativity can be formulated in one sentence: all physical laws and the equations that follow from them must be expressed in such a way that they are invariant with respect to the Lorentz transformation.

Later, Einstein decided to extend the factor of constancy of the speed of light in the void to any coordinate systems, including accelerated ones. This meant that there was no reason to elevate to a fundamental principle the invariance of only inertial systems. We must agree that nonlinear transformations of coordinates X_1,X_2, X_3, X_4 are considered covariant. If we make such a transformation of the rectilinear coordinates of the special theory of relativity, the metric becomes a general Riemannian metric. Einstein selected a special group of continuous coordinate transformations, acting as Lorentz transformations in the private theory, which provided relative covariance of the basic equations of physics when passing from one accelerated coordinate system to another.

This allowed us to make a broad generalization according to which there is no physically isolated state of motion in nature. Consequently, there cannot be any privileged reference systems and the equations of physics must be covariant with respect to any point transformations of the four-dimensional space-time continuum. The author of the theory of relativity has this provision as a general principle of covariance, representing the only possible solid foundation on which the whole building of physical science should be erected.

There is no objection to the fact that the general principle of relativity, indicating that the laws of physics must be covariant with respect to any transformations of coordinate systems, is a fair limiting principle. Maybe like the one that underlies thermodynamics and forbids the construction of a perpetual motion machine. This general principle of relativity requires that the physical laws of nature remain unchanged for an observer associated with any coordinate system. We must assume that the principle of general covariance exists independently of the theory of relativity it is embedded in the very nature of things. But whether Einstein's equations contain a real reflection of the laws of nature, or they are purely mental mathematical combinations, working on themselves is still a very large and critically important question.

It is known that any physical law valid for some coordinate system can be reformulated in such a way that the new expression will have a general-covariant form. There are always a sufficient number of field equations that allow such a general-covariant formulation. Of course, the theory of relativity offers such solutions which, being generally covariant, also seem to be quite simple. But such a merit alone cannot guarantee that Einstein's equations are consistent with the laws of nature.

For us, in this situation, the main question seems to be the following: what physical properties of space and time are taken as a basis allowing us to establish the general covariance of physical laws during the transition from one coordinate system to another? And only after that to ask a question: what mathematical kind of equations should be, satisfying the real expression of physical properties of space and time? In other words, the only firm guarantee to ensure that the equations of the theory of relativity fully correspond to objective reality can be a clear statement of the physical processes behind their mathematical facture. After all, real life in the universe goes on in the interaction not of mathematical, but solely and only of physical laws.

In this sense, the theory of relativity is extremely stingy, because nothing but light postulates, expressing really physical property of four-dimensional space-time, and it is unclear at the expense of which the general covariance of Einstein's equations, it has never offered. The statement about constancy and uniformity of the speed of light in the void for any coordinate systems is just a bare declaration. Such a statement cannot satisfy our natural desire to comprehend the true physical content of such a theoretical revelation.

And then, the light postulates cannot be taken as an absolutely reliable factor. They have never been tested by anyone and are entirely of empirical origin. No one ever set out to measure the speed of light in any coordinate systems. One cannot guarantee, for example, that the speed of light on the surface of the Moon is equal to the speed of light on the surface of Mars. Therefore, the light postulates, in their broad application, are, in fact, nothing more than wishful thinking.

In general, it is possible to argue about the constancy of the speed of light more or less definitely only in inertial frames of reference, in the absence of gravitational fields. When the full geodesic coincidence of the trajectory of the light signal is preserved and it is possible to compare two trajectories by superimposing one on the other. Or by correlating these trajectories with some rigid standards. In accelerated frames of reference the carrying out of such procedure faces known difficulties. Here the coordinate axes themselves cannot be interpreted as a result of measurements with solid selfcongruent standards and isochronally flowing clocks. Consequently, comparison of trajectories of light signals and comparison of their velocities, at transition from one curvilinear frame of reference to another, becomes a very problematic, if not impossible matter.

And even if in reality the speed of light is constant and the same for all coordinate systems, we necessarily need to know why this happens. Finally, we must be able to answer the sacramental question posed by the Almighty to Job in the Old Testament: "In what ways does light flow?" Without an answer to this archival and complicated question, the real physical value of the theory of relativity seems very relative.

It is no secret that in the depths of fundamental theoretical generalizations lie assumptions that are not always supported by reliable rational knowledge. Thus, the assumption of constancy and the same speed of light for any coordinate systems is a vivid confirmation of it. This is because we are never able to fully comprehend the general physical picture of the outside world. At the limit of our cognitive capabilities, there are always such assumptions that allow us to bring the system of scientific ideas about the world around us into a more or less logically coherent state. In such circumstances, the question is always how deep and how broadly the proposed assumption covers the multifaceted spectrum of physical manifestations of nature. An assumption is acceptable as long as new experimental and theoretical developments do not permit the formulation of an even more general assumption that includes the previous one as a special case of limited applicability.

It is believed that the true experimental guarantee for the acceptance of the light postulates were the negative results of experiments to detect the ether wind effect. However, from the results of the Michelson-Morley experiments does not follow unambiguous prediction of constancy and uniformity of the speed of light for any coordinate systems. We have already said that the only reliable conclusion, which directly follows from the results of these experiments, is that the speed of light in the personal space-time continuum of the Earth is equal to ***300 000 km/sec*** in all directions. But due to the fact that the velocity of light in the Earth's **PS-TC** is characterized by some constant value, a free extrapolation of this constant to all other space-time continuums is not at all desirable. Moreover, we have every reason to believe that the value of light velocity of ***300 000 km/sec*** relates only to the terrestrial **PS-TC** and characterizes metric properties of exactly terrestrial personal space-time.

Thus, if the local terrestrial gravitational field is considered, according to the equivalence principle, as an equi-accelerated frame of reference, we can afford the following reasoning. Acceleration is the change of velocity of a reference mass of matter relative to an external reference frame or relative to the initial conditions of the experiment, because the acceleration is registerable without reference to any external reference frame. In addition, it is known that, according to the equivalence principle, an isolated observer is unable to distinguish acceleration from the presence of a gravitational field. In this case, an observer isolated in the terrestrial gravitational field (let us assume, closed in an empty elevator) can turn on his measuring instruments at any moment of current time and define his state as a constant increase of his own velocity with respect to initial conditions of experiment with a characteristic of ***9,8 m/sec***^{2}. There is no contradiction in this: the equivalence principle allows an observer isolated in the Earth's gravitational field to consider his own state as a uniform acceleration with a characteristic of ***9,8 m/sec***^{2}. Despite the apparent resting state of the observer relative to the Earth's surface.

Now the question arises: how long an isolated observer can register his acceleration, if it follows from the theory of relativity that nothing can move faster than the speed of light? After all, sooner or later the observer, based on the readings of his instruments, will register reaching and exceeding the speed of light relative to the initial conditions of the experiment. In this regard, let's find out, after what period of time an isolated observer will register the achievement of the speed of light. The obtained value will be equal to the lunar Mohammedan calendar year:

$$\boldsymbol{t = \frac{c}{g}} \qquad \textbf{(3.11)}$$

Here $\boldsymbol{t}$ is a period of time containing twelve lunar, or synodic months (each synodic month includes 29 days, 12 hours, 44 minutes and 2.9 seconds); $\boldsymbol{c}$ is the speed of light in a vacuum; $\boldsymbol{g}$ is the acceleration of gravity at Earth's surface.

It is known that the Mohammedan year is tied to the lunar cycle and corresponds to the period of time after which the Moon returns to its original position. If an observer isolated in an empty elevator synchronizes the beginning of the experiment with the position of the Moon on the celestial vault, he will find that the Moon returned to its former position when it reaches the speed of light. Such a situation is very similar to the situation of a traveler trying to reach the edge of the Earth. His efforts invariably culminate in a return to the starting point, as if to the initial conditions of the experiment.

The Moon is a natural satellite of the Earth, and the course of its trajectory on the orbit around our planet is substantially determined by the force of the Earth's gravitational field. It is hardly a coincidence that, according to the equivalence principle, the observer isolated in the Earth's gravitational field reaches the speed of light in a period equal (with great accuracy) to the lunar calendar year. This circumstance indicates the existence of a yet unknown to us deep relationship between the spatial and temporal topology of the Earth's gravitational field and the characteristic of the speed of light signal passage in it. It may well happen that the value of the speed of light in a vacuum of ***300 000 km/sec*** is not something absolute and universal for the entire universe. It is very likely that this value expresses personal metric properties only of the Earth's **PS-TC** and is actual only for the Earth's gravitational field.

Of course, this is still a free, non-binding assumption that needs serious work. However, it is critically important for us to learn how to explain the origin of equation **(3.11)**. This equality is too precise and convincing to be a mere coincidence of chance. And most importantly, if, according to Einstein, the physical properties of four-dimensional space-time are conditioned by the light postulates, in their categorical immutable formulation, the reality may be quite different. It is not excluded at all that the most different values of the registered speed of light in vacuum can be the expression of the metric structure of all possible other gravitational fields, i.e. different accelerated coordinate systems of readout. Because from **(3.11)** it follows:

$$c = t\,g \qquad \textbf{(3.12)}$$

The uniqueness of this equality is that it allows us to deduce the known value of the speed of light in vacuum by means of the gravitational potential of terrestrial personal space-time.

It may happen that we will have to abandon Einstein's light postulates in their universal categorical formulation. It will be followed by creation of new global theory of relative motion in which covariance of basic equations of physics will be carried out not due to constancy and uniformity of speed of light in any coordinate systems, but on the contrary — through change of this speed. In any case, the problem of the velocity of light, as a reference point of the theory of relativity, requires the closest attention.

So far we have nothing to do but to build our worldview on the basis of Einstein's light postulates. The more so that the earthly personal space-time continuum fully meets their requirements and allows us to fully describe the general picture of the surrounding world.

4. QUANTA OF MOTION

The main purpose of the theory of relativity is to be able to fully illuminate and quantify the results of various kinds of motion. We understand that man lives in a constantly changing world, a world of kaleidoscopic movement of all kinds of material objects relative to each other. To bring the dynamic picture of the external world into some coherent state, it is important to learn how to freely and adequately describe and navigate motion. For this purpose, four-dimensional coordinate grids are used in the theory of relativity, in which three dimensions are spatial and one is temporal. Four-dimensional coordinate systems in it perform the function of the world space-time framework, on the metric structure of which the observed relative motion is realized.

Einstein was the first to realize that time propagates in space with a finite speed, characterized by the rate of electromagnetic field expansion in the Maxwell-Lorentz equations. The situation when time loses its absolute character, due to the impossibility to cover spatial distances infinitely fast, leads to the fact that four-dimensional spatio-temporal perception of reality becomes the only possible. The private theory uses linear four-dimensional coordinate axes that satisfy the requirements of Minkowski space-time geometry when the axioms of Euclidean geometry are satisfied. The general theory of relativity involves curved coordinate axes, entailing the emergence of curved space-time with a pseudo-Riemannian metric that is immune to Euclidean geometry.

In relativity theory, the location of a test body, is called an "event" — it appears as a point argument and is given by a set of real numbers, which are the projection of the control point on the four coordinate axes. With the square of the interval dS^2, enclosed between two events as close as possible, and depending on the form in which it is solved, the theory of relativity traces the trajectory of motion and determines the relative speed of movement of the observed material object in the adopted space-time coordinate frame of reference.

When Einstein set himself the task of establishing the trajectory of the test body's location in a free gravitational field, he assumed that, based on the requirements of the equivalence principle, the trajectory of the reference body location should be completely determined by the geometry of curved space-time and also be described by solving the interval dS^2. Thus, in terms of mathematical execution, Einstein's theory of relativity is to an excellent degree a theory of the solution of the differentiated spacetime interval dS^2. To this we can add that the interval enclosed between two arbitrarily close events is solved on the basis of the Pythagorean theorem establishing equality of the square of the hypotenuse of a right triangle to the sum of the squares of its cathetuses.

In discussing the conceptual content of the theory of relativity, we must recognize that it radically expanded the boundaries of our understanding of the general picture of the world around us due to the revision of the physical status of the fundamental categories of the universe. Thus, Einstein managed to deprive space and time of their casual absoluteness, when only they could influence the location of massive bodies, and they themselves could not be influenced in any way. The theory of relativity exposed the deep relationship between the masses of matter and the metric structure of the space-time surrounding them. However, it did not provide us with any conceptual equivalents for the real nature of this relationship, for its real physical content.

The fact is that by itself the use of mathematical four-dimensional coordinate grids when describing the motion is not able to shed light on the physical nature of the union of space and time in a single topological fabric. And certainly no coordinate systems are able to provide understanding of the principles of gravitational interaction between curved four-dimensional space-time and mass of matter. Strictly speaking, the application of four-dimensional coordinate grids in relativity theory, without proper conceptual physical support, significantly aggravated the general situation with deep comprehension of kinematics of motion, and at the same time with comprehension of nature of the world gravitation. In this case, we prudently put out of brackets the hypothetical assurances about existence of gravitational waves. At least for the total absence of comforting experimental results. We will certainly return to this topic.

Here, summing up the intermediate result, we note that in accordance with specificity of conceptual and mathematical context of the theory of relativity there was, as if in passing, an obvious replacement of the physical space-time arguments by the abstract geometrical variety. Moreover, the manifold is so detached from mental rational comprehension that it still does not lend itself to any physical attestation accessible to our imagination. We still do not know what lies behind the four-dimensional space-time continuum of the theory of relativity, furnished with light postulates, and what, therefore, characterizes the solution of the interval dS^2. We cannot present this solution with complete certainty as the only true, infallible description of the results of relative motion, which cannot be arbitrarily changed or overridden at all.

In reality, we do not know to what extent our mathematical calculations adequately reflect the true picture of the most complex processes occurring in the mysterious depths of the material world. The imaginary identity of physical realities and their mathematical counterparts is very problematic. The entire history of the development of natural science is the truest proof of this. Suffice it to recall the complete surrender of Newtonian mechanics, which, in essence, is also mathematical. It is therefore extremely important that our auxiliary mathematical tools do not burden the already shaky conceptual theoretical basis of physics with artificial contradictions. In this sense, the theory of relativity is by no means without sin. We can distinguish at least three serious problems, which defy logical comprehension, in connection with the solution in the theory of relativity of the interval dS^2 and interpretation of its components as point representations of the concept of "event".

Let us dwell on these problems and carefully analyze each of them separately.

It is believed that the unified field theory created by Einstein was seen by the author as a universal theoretical generalization covering all kinds of physical interactions (strong, weak, electromagnetic and gravitational). Such an intention, of course, has its own reasoning, and it would be desirable that the new comprehensive theory would cope with various kinds of interactions and accompany them with a reliable mathematical apparatus. But it was not only this problem, and perhaps more importantly, an entirely different one, that kept Einstein busy and provoked his creative search. The root cause pushing the author of the relativity theory to derive new solutions to the equations of motion, lies in the desire to go beyond using the interval dS^2 only as a measure of space-time relations, and also try to extend its influence on the geometric parameters of the control masses of matter. Let's see, what is the point here?

Figure 1 shows two fixed moments of the location of a steel ball moving along the X-axis.

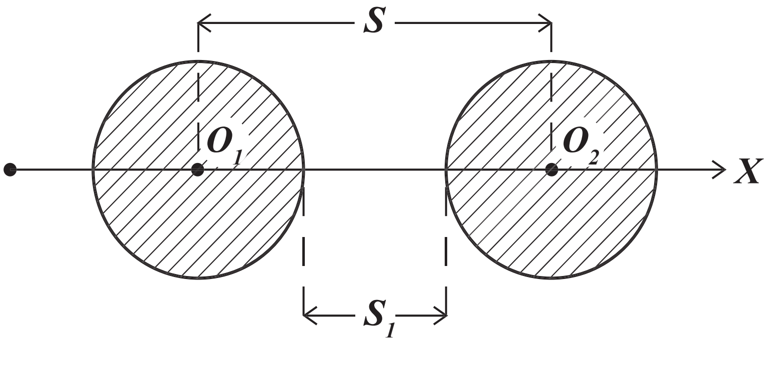

Fig. 1

In the theory of relativity, however, as well as in Newtonian mechanics, the masses of matter appear in the form of mathematical points. According to this position, the distance between two fixed moments of location of a steel ball moving along the axis $\boldsymbol{X}$ is the interval $\boldsymbol{S}$, enclosed between points $\boldsymbol{O_1}$ and $\boldsymbol{O_2}$. Within the framework of classical mechanics, the interval $\boldsymbol{S}^2$ appears as a mathematical measure of the distance between the points $\boldsymbol{O_1}$ and $\boldsymbol{O_2}$. Which, from the point of view of mathematics, is quite admissible, moreover, it turns out to be quite sufficient for the normal functioning of Newtonian mechanics. In the theory of relativity, the situation is quite different. In this theory the distance between $\boldsymbol{O_1}$ and $\boldsymbol{O_2}$ is presented not as a conventional mathematical measure of distance, but as a natural space-time interval, which has real physical properties, equally and along with the moving material object of matter. Real physical properties of such spacetime interval follow directly from the light postulates.

Figure 1 clearly shows that, in strict presentation, the spacetime interval between two fixed moments of location of a steel ball moving along the axis $\boldsymbol{X}$ is distance $\boldsymbol{S_1}$ and nothing more. Otherwise, if we accept the distance $\boldsymbol{S}$ as a valid spacetime interval, we will have to justify the reduction of the mass of the substance of the steel ball to the status of a spacetime argument equipped with light postulates. That is, it is necessary to solve the problem of the difference ($\boldsymbol{S}$ minus $\boldsymbol{S_1}$). It is necessary to define somehow with this difference and to refer it somewhere - whether to matter, or to space-time. The theory of relativity is silent in this question, although as the interval $\boldsymbol{S}$ approaches the differential expression, this problem becomes even more acute and hopelessly unsolvable.

If we reduce the distance between $\boldsymbol{O_1}$ and $\boldsymbol{O_2}$ to the level of differential calculus, it appears that the interval $\boldsymbol{dS}^2$ is inside the steel ball itself. When it is no longer a measure of space-time relations, but a measure of the distance between two points of substance $\boldsymbol{O_1}$ and $\boldsymbol{O_2}$ (Fig. 2). Hence, in relation to the interval $\boldsymbol{O_1O_2}$ it would be fair to call it a kind of four-dimensional real-space plus time geometric argument. By the way, it has nothing to do with the light postulates.

After all, within the boundaries of the mass of a steel ball the fulfillment of the light postulates, to put it bluntly, becomes difficult.

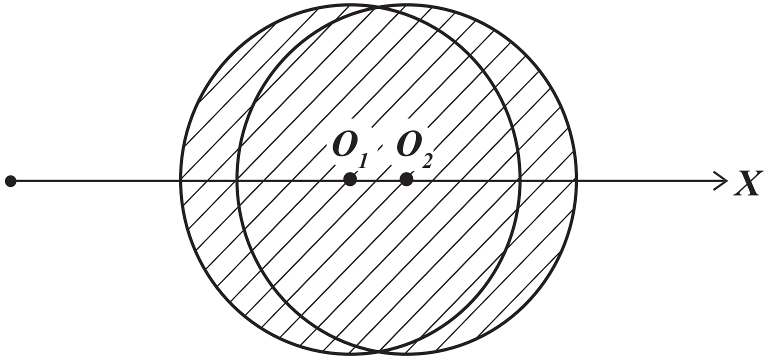

Fig. 2

Figure 2 clearly states that the natural interval between O_1 and O_2 is a measure of the distance between points of matter. To say that this interval characterizes spatio-temporal relations is to deprive matter of the quality of objective physical reality. On the other hand, if one unambiguously declares the interval between O_1 and O_2 to be a measure of distance between two points of matter, then one would have to abandon forever the possibility of considering this interval as a spacetime argument. After that the theory of relativity automatically loses all its logical foundations, it simply cannot be used as a theory operating with space-time relations.

Einstein, of course, was aware that his theory is workable only in the conditions of point, hence immaterial representations of material objects of matter. In the mode of existence of extended physical bodies, the differentiated interval between two events loses the quality of space-time reality only, and becomes also a measure of distance between two points of substance. In reality, we are surrounded by a world of volumetric, that is, bodily extended objects. Therefore, the question is inevitable: how can the transition from matter to space-time be made, and is such a transition possible at all? The theory of relativity is silent in this regard. In Einstein, the first problem of the interval dS^2 remains unsolved, so to speak. It is related to the transition of matter into space-time or, conversely, the transition of space-time into matter.

The author of the theory of relativity hoped very much to overcome this problem with a unified field theory. It was assumed that in the new universal theory of motion space-time and matter could act as derivatives of a common topological structure. This would allow the interval dS^2 between the categories "matter" and "space-time" to be manipulated naturally. This was what Einstein's basic expectation of a unified field theory was. After all, without understanding to the end what characterizes the interval dS^2 — the distance between two points of matter or two points of space-time - it is impossible to reliably determine the degree of objectivity of the theory of relativity. And only then, as if in the background, the ability of a unified field theory to provide a description of various types of interactions was outlined.

The second problem of the interval dS^2, not less acute and principal than the first one, is formed in the theory of relativity from our contradictory attitude to motion as such. The essence of this problem is as follows. It is known that the trajectory of the location of a moving object ultimately consists not of a set of intervals dS^2, but of a continuous chain of many events. The point is not only that the interval is a concept secondary to the concept of "event", although there is a deep sense in this too. The point is, first of all, that actually, at any fixed moment of the present time, we can observe an event only in a single instance. The presence of the second event, which closes the interval dS^2, has a purely intellectual origin. The second event, at each moment of registration, exists only in our mental imagination. In principle, it is impossible, without connecting an imaginary past or future time, to observe the interval dS^2.

Consequently, such an interval is not so much a reflection of objectively existing realities taken at any fixed moment in the present, as a product of our intellectual self-expression. However, the laws of nature must manifest themselves at the level of actually observed phenomena and quantities, regardless of the interference of our imagination. This circumstance is of a fundamental order: either we are engaged in describing the processes actually occurring in the world around us, or we take it upon ourselves to investigate the products of our intellectual faculties.

The paradoxical complexity of registering relative motion within a single event was first demonstrated in Zeno's famous aporia. Recall one of his aporias with a flying arrow, when the tip of the arrow passes nearby in space and time points ***A, B, C***. Zeno constructed a logical chain, according to which at the moment when the tip of the flying arrow is at point ***B***, it is no longer at ***A***, but it is not yet at ***C***. In the present, elusive, zero-length edge between the past and the future, at point ***B***, the arrow's point is at zero time interval, in other words, it is not there. By dividing time and distance traveled, Zeno sought to approximate a perfect, instantaneous motion contained within a point. Without such motion within a point interval of space and time, as the thinker believed, the course of motion itself loses real physical meaning.

In essence, the question of the location of the tip of the flying arrow and the resulting paradoxes is reduced to the problem of adequate attribution of the concept of "event". The point interpretation of the concept of "event" adopted by Zeno and which has survived to this day was formulated on the basis of Democritus' notions of space, time and matter. Classical Newtonian mechanics consolidated these notions, clothed them in a rational mathematical form. The theory of relativity filled the categories of "space" and "time" with an updated, relativistic content. But the very concept of "event" retained the features of the old classical mechanics in Einstein's worldview. Because Einstein failed to illustrate the transition from a state of rest to motion within the framework of a single event. In the author of the theory of relativity, the event still retains a point mathematical nature, regardless of the kinematics, say, whether the state of rest of the arrowhead or its flight.

There is no doubt that an optimal theory of relative motion must be guided by the rule that the equations of mechanics can only correspond to objective reality and meet their direct purpose when the motion within a single event is given. When it will be possible, at some fixed moment of current time, to derive from the state of motion another state following in time immediately after the first. Otherwise we will never learn to trace emergence of motion trajectory, which in reality consists not of geometrical intervals enclosed between two point events, but of fragmentary quantum events, undividedly comprising the quality of past, present and future time. In the future we will have a detailed conversation about this.

The theory of relativity takes into account the interval between two events, which is the accomplished fact of the result of motion. Like Newtonian mechanics, it leaves out the dynamic moment, that is, the transition from one event to the next. All references to the differential interval dS^2, simply put, references to the level of infinitesimal quantities, do not contribute in any way to understanding the kinematics of motion and only drive the problematics to incomprehensible limits. An event is a single event, while an interval dS^2 is two separate events bearing different coordinate-signs. How the transition from one point event to another occurs, the theory of relativity does not know, in fact remaining in the captivity of Zeno's aporias. Thus, the inability of relativity theory to describe motion within a single event is the second problem of the interval dS^2 extracted from Einstein's four-dimensional coordinate grids.

The third problem of the interval dS^2 follows from the apparent contradiction between the equivalence principle and, again, the point concept of "event". This problem arises as follows:

General relativity theory states that the existence of a gravitational field is due to the existence of a pseudo-Riemannian metric in four-dimensional spacetime. The metric structure of such curved spacetime determines the size and geometric configuration of the square of the differential interval dS^2 characterizing the minimal fragment of acceleration. The origin of the geometrical interval itself is connected with the sketching of a four-dimensional coordinate grid on the gravitational field and an arbitrary choice of two infinitely close to each other control points. Of course, the procedure of choosing two points closing the interval dS^2 is purely speculative, which, nevertheless, allows us to numerically mark the minimal geometrical fragment of acceleration and to find for it an adequate mathematical expression.

If we place, according to the equivalence principle, a test body in curved space-time, it will experience universal gravitation. We understand that realistically, at any fixed moment of current time, a point event can be present at only one point of curved spacetime. For an observable event to obey the geometrical setting, according to the theory of relativity, and to move from one point of curved space-time to another, the initial, so to speak, initial point event must be able to take on topological information about the surrounding space-time. Meanwhile we know that a point is by definition neutral to any geometrical constructions, for one cannot reason with respect to a point what geometrical structure it is a part of. A point interpretation event is fundamentally unable to take on topological information about the surrounding space-time and, consequently, unable to obey its topological constructions.

The inability of a point event to respond to a curved spacetime casts doubt on the very possibility of a dS^2 interval adequate to this metric manifold. It becomes simply incomprehensible how the dS^2 interval can arise as a result of the presence of a test body in curved spacetime.

Thus, it is possible to state with certainty that there is a clear contradiction between the equivalence principle and the point concept of "event". In order to overcome this contradiction it is necessary to take an event beyond a point and provide it with quantum geometrical representation. Quantum fragmentation will allow an event to assume topological information about surrounding space-time and to obey its metric settings. So that spacetime interval dS^2, identical to a given metric structure, can emerge. This, in fact, is the third problem of the dS^2 interval, in the Einsteinian methodology of describing the kinematics of relative motion.

Throughout his remarkable career, Albert Einstein consistently defended the conviction that all physical laws must have an unconditional space-time expression. That there is no law that cannot be stated in the language of space-time relations. It is difficult to object to this statement, but it does not follow that the laws of nature must have exactly the spatio-temporal support proposed by the author of the theory of relativity. In particular, it is not necessary that the minimum element of relative velocity be determined in a geometric manifold by solving a differential interval dS^2. That is, using equations that have regular continuous solutions.

Modern experimental science convincingly demonstrates that predominantly periodic elementary processes are realized in nature. They, in principle, do not lend themselves to a differential fractionation and are exclusively quantum in nature. In this connection it is natural to suppose that space-time characteristics of minimal interval of motion should also have fixed quantum formation and not be subject to infinite division.

Newton in his time laid the foundations of differential calculus in order to be able to give an accurate mathematical estimate of relative velocity and acceleration. Differential equations allowed him to trace a continuous geodesic trajectory of movement of an idealized material point, signifying a control mass of matter, in an equally idealized democritical space and time. In fact, nothing prohibited Newton from making an infinite fraction of a minimal fragment of motion in imaginary empty space and absolute everywhere uniformly flowing time. After all, the latter did not possess any real physical properties in the presence of which, in principle, any limitations could arise.

The logical completeness of classical mechanics was due to the fact that the same reference masses acted as the only cause of interaction between masses of matter in it. And the world's imaginary spatial and temporal framework was accepted as that ideal, non-objectively registerable framework which did not prevent its infinite mathematical division.

Einstein, on the other hand, set himself an incomparably more complicated task. He combined space and time into a single geometric manifold and endowed this metric structure with specific physical properties. These physical properties, albeit only in the form of light postulates, were nevertheless assigned to four-dimensional space-time. Such a decision was not the free will of a scientist, it was predetermined by the general progress of physics and, in particular, by the results of experiments on the discovery of the ether wind effect. Experiments irrefutably demonstrated that four-dimensional space-time operates in the mode of light postulates. Consequently, it acts as an objective physical reality, along with the masses of matter. In this case, the motion itself had to be considered not simply as a classical transfer of matter from one area of empty space and absolute time to another, but as a result of a special kind of interaction between a moving material object and the same physically active four-dimensional space-time.If empty space and absolute time of classical mechanics allowed applying any mathematical solutions, only if they allowed tracing an imaginary trajectory of the observed object in emptiness, then thermal In the conditions of updated ideas about fundamental categories of the universe, the mathematical apparatus used in the description of motion must necessarily be adequate to the physical interaction between actively acting four-dimensional space-time and the material object of matter moving in it. This interaction must be natural and consistent, excluding the occurrence of paradoxes, mentioned above, during the analysis of the three critical contradictions arising from the differential interval services dS^2.

Without a doubt, the most vulnerable side of the theory of relativity, due to its mathematical conservatism, is its fatal adherence to the Newtonian differential calculus. Here the favorable development of Faraday and Maxwell's electromagnetic field theory played a frankly provocative role. In the electromagnetic theory, the field acts as an objective physical reality that carries energy. This reality is described by continuous functions derived from geometric coordinate systems. The main conclusion of the field theory is the assertion that the interaction between electric charges is realized not by the instantaneous reaction forces acting between them, but by processes that propagate in space with a finite speed.

If in the electromagnetic theory the place of reality, along with electric charges, is occupied by the electromagnetic field, then in the theory of relativity in place of the electromagnetic field appears a four-dimensional space-time. It acts as a world geometric framework, equipped with light postulates, in all theoretical constructions. In this regard, it seemed most natural for Einstein to transfer the method of differential calculus, which successfully worked in the electromagnetic field theory, to the theory of relative motion that he was creating. Moreover, the supposed identity of electromagnetic and optical processes actually predetermined for the author of the theory of relativity the use of the equations of electromagnetic theory, including the Lorentzian transformations of coordinate axis systems.

We must, of course, pay tribute to Einstein. He was never a blind guide to the mathematical solutions of electromagnetic theory, mechanically transferring them into the theory of motion that he created. Suffice it to recall how insistently he selected geometric equivalents in the hope that topology would be able to project the real physical properties of four-dimensional space-time and allow him to formulate a unified field theory. Just such a theory of total unification of all known kinds of interactions, in which four-dimensional space-time and material objects of matter will coexist so harmoniously that it will allow to interpret any physical processes by some universal metric relations.

What can I say? Of course, geometry can be seen as a science capable of projecting onto itself the logic of physical interactions occurring with matter in space-time, and consider these interactions in topological expression. However, the metric structure of relativity theory, in a four-dimensional geometric version, does not make this theory free from the whole set of problems that arise after solving the interval dS^2 extracted from Einstein's four-dimensional space-time. In order to free relativity theory from the necessity of applying the differential interval dS^2, it is not necessary to perform any intricate multiway operations on it. It is enough to take the notion of "event" beyond the point and give it a quantum space-time formulation. If we manage to fill the notion "event" with quantum content, we will be able to consider a control event as a limiting topological element of relative motion, as a quantum of relative speed, not subject to further fragmentation.

The event in quantum formulation will allow us once and for all to do away with the necessity to use the differential interval dS^2 when describing relative motion. Because the characteristic of the geometrical space-time configuration of a single reference event will be quite enough to quantify the relative velocity.

By parting with the differential interval dS^2, we will, firstly, remove the problem of the transition of the spacetime interval to the mass of matter. Or, on the contrary, the expansion of the geometry of matter into the spacetime topology. What was mentioned above and what the theory of relativity hopelessly rests on.

Secondly, with taking the notion of "event" beyond the point, we will be able to track the progressive course of motion at any fixed moment of current time. After all, the metric format of a reference event, at any fixed moment of current time, will be covered by a quantum wave packet. Consequently, the statement that the tip of the flying arrow is located at some idealized, i.e. mathematical point, will lose all meaning. The location of the point of the flying arrow will be an indivisible quantum event, and we will finally do away with paradoxes of motion, which the wisest philosopher Zeno formulated back in ancient times.

And thirdly, an event clothed in quantum design will be able to react naturally to space-time topology. That is, the control event will be able to take on the metric settings of curved space-time and be influenced by its geometry. In full accordance with the equivalence principle.

Experimental physics convincingly demonstrates that in the microcosm the existence of elementary forms of matter is subject to corpuscular-wave laws. Accordingly, an exhaustive theory about the motion of material objects relative to each other must reflect this objective reality and organically combine both forms of corpuscular and wave mode of motion. Meanwhile, the theory of relativity blatantly "ignores" the corpuscular-wave dualism, as if it has nothing to do with this undeniable objective reality. Einstein was a scientist extremely consistent and everywhere advocating a careful treatment of experiments, he made great efforts to eliminate such an apparent inconsistency of his theory of relative motion with the logic of direct observation.

A reasonable question arises: what prevented the author of relativity theory from using quantum regularities in its orbit? What prevented the scientist from taking the category "event" beyond the mathematical point and filling "event" with quantum physical content? After all, such a decisive maneuver would have immediately allowed Einstein to get rid of the services of the differential interval dS^2. Such a serious reason did in fact exist; it was the choice of mathematical tools for the theory of relativity. To get to the origins of these reasons, one must reflect on the validity of the geometrical signature of the key equations of relativity theory. In other words, it is necessary to find out whether the space-time topology of the equations of relativity theory is really an expression of a four-dimensional geometric manifold?

In this connection, let us try to understand where, in fact, the number "four" came from, why exactly four coordinate axes represent the space-time topology in the equations of relativity theory? It is generally believed that Einstein's four-dimensional coordinate grids, by analogy with Hermann Minkowski's coordinate systems, result from the superposition of three spatial coordinate axes and one temporal one. The theory of relativity, however, categorically states that no three-dimensional space in nature does not exist, as well as there is no absolute, everywhere uniformly flowing one-dimensional time. In this case, it turns out that the four-dimensional coordinate grids of the theory of relativity arise after adding up the physical realities that do not exist in nature. That is, the number "four," which characterizes the signature of the equations of relativity theory, is taken after the addition of geometrical measurements from physical categories that do not exist in nature. We knowingly add up something mental, but at the same time we expect to find an analogue of physical reality provided with light postulates.

It should be emphasized that the choice of the mathematical and conceptual arsenal in theoretical physics is always very closely linked to the choice of metric topology and to an adequate reading of the signature of coordinate axes corresponding to the accepted geometry. It is our responsibility to be very responsible about which geometric manifold is behind the mathematical tools used and what is the true signature of the topology of this manifold. To take something not quite intelligible and add it to something equally incomprehensible when establishing the signature of the metric structure of the equations of relativity seems totally unacceptable. The traditional reading of Minkowski's equations in the four-digit metric signature seems equally unacceptable.

Let us write this equation again:

$$S^2 = (ct)^2 - (x^2 + y^2 + z^2) \qquad \textbf{(4.1)}$$

We have already noted that the binding of this equation to four coordinate axes is in logical contradiction with the dimensionality of the argument $(ct)^2$. In the question of establishing the metric structure of the applied mathematical toolkit no ambiguity should be allowed. Meanwhile it is absolutely incomprehensible how one coordinate axis stated as a time axis can carry on itself the dimensionality ***m·sec/sec***. In accordance with the dimensionality $(ct)^2$, it is most natural to consider this argument as some hitherto unidentified three-digit function unfolded in a three-dimensional coordinate system, carrying on its axes the metric marking ***m,sec,sec***.

Thus, there is an assumption that the metric structure of the Minkowski equation is based not on four but six coordinate dimensions. Meaning the sum of the three coordinate axes represented in the argument $(ct)^2$ and the three Cartesian spatial coordinate dimensions $(x^2 + y^2 + z^2)$. In order to establish the true topology of the Minkowski equation and hence its true signature, it is necessary to carefully analyze the root structure, the origins of the very origin of this equality.

When discussing the origin of the Minkowski equation, as well as the origin of any other physics equation, one should keep in mind that no mathematical formulation is actually a direct reflection of objective reality. Any equation of physics is a direct reflection of some measuring procedure by which the researcher is able to quantify observed processes. We most often do not think about it, but even the most commonplace statement "a loaf of bread weighs one kilogram" actually means that we have a measurement procedure at our disposal by which a given loaf of bread can be brought into equilibrium with a kilogram weight standard. Outside of the measuring procedure, the statement "a loaf of bread weighs one kilogram" makes no real physical sense.

When we claim that the space-time topology of relativity theory is an expression of a four-dimensional geometric manifold, this actually means that we have reliable measurement procedures at our disposal to establish such a four-dimensionality. The number of coordinate axes, i.e. the signature of a given metric structure, will correspond to the number four only if the readings of laboratory instruments allowing us to describe the geometric properties of the investigated space-time will be tied to four independent coordinate dimensions.

Herman Minkowski's famous equation is built on a measurement procedure that assumes some laboratory instrumentation. For example, the argument $(x^2 + y^2 + z^2)$ implies a Cartesian coordinate system consisting of three spatial metric axes. The Cartesian coordinate system is a geometric measuring instrument consisting of three linear metric standards arranged relative to each other at right angles. Any event or control object that is measurable with such a simple tool can be represented and described as an element of a three-dimensional spatial geometric manifold. Behind the argument $(ct)^2$, in the Minkowski equation, are two independent laboratory instruments — the light signal and the traditional chronometer. These two laboratory instruments allow, using a light signal and an isochronally running clock, to cut off control points in space and to establish a light-like relation between them.

Classical mechanics described motion in space and time, taken separately, only because it was incapable of bringing space and time into a single topological fabric. Isaac Newton simply had no idea how to add or subtract meters to seconds. For this, he had to learn how to create an adequate metric structure, so that the geometric properties of space and time could be organically combined in it. Only after that could we begin to write equations for space-time relations.

After we learned to establish a light-like relation between two control points of space by the method of the product of the speed of light and a certain period of time, we had an opportunity to translate a temporal interval into a spatial interval. As a consequence, we have gained the ability to subtract $(x^2 + y^2 + z^2)$ from the temporal argument $(ct)^2$ translated into the spatial interval. All this is precisely present in the mathematical facture of the Minkowski equation.

If we turn to equation **(3.1)**, it is not difficult to establish that to determine the true topology of this equality it is necessary to clearly understand the metric parameters of the three measuring instruments. These are a Cartesian system of spatial coordinate axes, a light signal, and a reliable chronometer. Application of the three laboratory instruments allows the researcher to perform measuring procedures in the course of registration of the results of relative motion in the accepted spatio-temporal geometrical manifold.

Now, guided by the common sense reasoning that any coordinate system or coordinate axis is a direct analogue of metric readings of some measuring instrument, let us try to find out the true signature behind the topology of equation **(3.1)**. In other words, let us find out how many coordinate axes are involved in equality **(3.1)** and what their real topological background is. It is commonly assumed that the Minkowski equation is composed in the signature $(3+1)$ when 3 are the three Cartesian spatial coordinate axes and 1 is the time coordinate axis. That is why it is claimed that the signature of equation **(3.1)** consists of four coordinate axes and corresponds to a four-dimensional geometric manifold. However, the statement just quoted hides a very insidious methodological mistake that leads us away from a true reading of the topology of the Minkowski equation. Such a mistake should be recognized as an arbitrary, ungrounded binding of the argument $(ct)^2$ to a single coordinate axis.

In fact, to establish the true signature of the argument $(ct)^2$ we must proceed from the simple circumstance that two laboratory instruments, the light signal and the traditional chronometer, must be used to register this argument. The results of the experimental readings taken from each of these laboratory instruments bear their own topological signature, associated with the direct purpose of the instrument used and belonging only to the particular, given laboratory instrument. In such a case, the true topology signature of the argument $(ct)^2$ must have the form as $(2+1)$. When 2 is the speed of the light signal along one coordinate axis of space and one coordinate axis of time plus 1 is the laboratory chronometer having its own coordinate axis of time.

The fact is that the metric structure of the temporal coordinate axis of the laboratory chronometer does not correlate in any way with the metric of the temporal coordinate axis of the light signal. The temporal coordinate axis of the laboratory chronometer includes the quality of the past, present and future time. As a matter of fact, it is an ordinary clock dial. Whereas registration of light signal always takes place on geometrically combined two-digit space-time coordinate axis with the dimension of m/sec. Earlier we have already noted that space and time are woven into an indissoluble topological fabric as a result of motion. It is also necessary to take into account that the registration of a light signal always takes place only as the present moment of time.

Returning to the question about the establishment of the real signature in the topology of the Minkowski equation, we have to agree that the real topology of the argument $(ct)^2$ should be identified not with one coordinate dimension, but with a three-dimensional geometrical structure consisting of a two-dimensional trajectory of light speed plus time coordinate axis. In such a case, it is safe to state that the true topology of the key equation of relativity theory has nothing to do with the four-dimensional systems of coordinate axes. Because the first argument of the right-hand side of equation **(3.1)**, meaning $(ct)^2$, contains three metric dimensions of independent origin and the second argument, respectively $(x^2 + y^2 + z^2)$, contains three metric dimensions of the Cartesian system of coordinate axes. Then the full signature of the Minkowski equation should be interpreted as ***(3+3)***, which corresponds to a six-dimensional geometric manifold.

It is significant that six-dimensional treatment of the key equation of relativity theory allows us to consider this solution in the corpuscular-wave duality regime. According to the relativistic views, the equation **(3.1)** defines a trajectory of displacement of a material object in the spacetime geometrical manifold. The displacement in the spatial topological plane is carried out along three Cartesian coordinate axes. Movements in the temporal topological plane are realized in the three-digit coordinate system carrying the dimensionality of the expression $(ct)^2$.

If in the three Cartesian coordinate dimensions the motion is carried out on the basis of corpuscular laws, when there is a classical transfer of matter from one region of space to another, the motion in the temporal metric plane is realized according to wave laws. Below we will consider in detail the process of appearance of wave perturbations in the temporal topological plane, in the course of relative motion. Here we will draw our attention to the fact that a peculiar ideological password to fusion of relativity theory with quantum laws was always safely kept in Herman Minkowski's equation. All that was needed was to thoroughly understand the topological signature of this equality.

The point is that the real physical meaning of the Hermann Minkowski equation is that the value of the minimal fragment of the observed relative velocity S^2 is determined by subtracting the coordinate projection of the geometric interval $(x^2 + y^2 + z^2)$ from the characteristic of the wave function unfolded in the three-digit coordinate system, corresponding to $(ct)^2$ dimensionality. Because from the point of view of the dimensionality itself, the geometric equivalent standing for $(ct)^2$ should be considered as some wave function unfolded in the three-digit coordinate system bearing on its axes the metric markings ***m,sec,sec***.

Einstein, in his time, with the help of light postulates, disproved Newtonian notions of simultaneity of two events separated by speed.

We will take the next step in understanding the physical nature of the category "time". The innovation of this step will consist in the fact that in the course of relative motion, the control mass of matter moves not just from one point of four-dimensional space-time to another, but there is a change in the temporal quality of matter. In other words, the substance moves from the quality of the past time, through the point of the present time, to the quality of the future time. And this movement of matter in the temporal quality is realized on the basis of wave laws.

The theory of relativity, in Einstein's conceptual and mathematical execution, is primarily a theory of corpuscular motion. The moving material object in it acts as a stationary formed mass of matter. A mass that in the course of relative motion is removed from one area of four-dimensional space-time and placed in another area of space-time. Whereas in accordance with the present theoretical generalization, a stationary formed mass of matter is stated only by a single, resting mass of matter, which is a stationary body of reference and determines the presence of this **PS-TC**. At the same time, all other masses of matter, which pass the registration in the accepted **PS-TC**, in the course of relative motion, are wave formations. It is because in the course of the relative motion there is a wave perturbation of the temporal quality of the matrix space, which makes up the material platform of the registered mass. Thus, in accordance with the wave laws, the moving mass of matter should be interpreted as a running perturbed local region of the accepted **PS-TC**, carrying on itself the energy $E = mc^2$. Thus, at each new moment of the current time the next local region of spacetime will be a material platform for the moving mass of matter.

The wave nature of relative motion, in temporal metric terms of the key equation of relativity theory, is convincingly proved by the very geometrical configuration of the three-dimensional function corresponding to the argument $(ct)^2$. Below we will necessarily illustrate that the development of this function in terms of classical motion occurs only along one spatial axis X. The development of the function along the two temporal dimensions takes place in a completely different, specific way.

We understand that movement in time is, in fact, a change in temporal quality. What is today will very soon be made yesterday, and what was tomorrow will be made today. Here is the simplest example of a change of events in temporal quality. And in the course of relative motion, such a change in temporal quality is carried out according to wave patterns.

From all above it is possible to conclude that the Minkowski equation, like no other solution of quantum physics, corresponds to the mode of corpuscular-wave dualism. In order to comprehend and reveal true essence of relative motion consistently, we must combine in our theoretical reasoning two ways of realization of relative motion — corpuscular and wave, fixed in our consciousness. Correlation between these two ways of motion, according to the rule of quantum indeterminacy, must have such dependence, that the more evidently we accept corpuscular or wave motion side, the further away we are from opposing dynamic kind.

The present theoretical study aims at developing mainly wave concept of relative motion, which, according to the rule of quantum indeterminacy, organically complements the corpuscular, let us say, traditional theory of relativity. If Einstein's theory of relativity accentuates the corpuscular forms of motion that can be visually controlled in the spatial topological plane $(x^2 + y^2 + Z^2)$, then the wave theory of relative motion is based on wave patterns that work successfully in the temporal topological plane behind the metric structure of argument $(ct)^2$. This argument itself, therefore, we will consider as a kind of wave function, according to which the quantum interval of relative motion is calibrated. Knowing characteristics of such wave function, it will be possible to find phase, as well as relative, velocity of material object movement in the accepted personal space-time continuum.

Since we aim to formulate accentuated wave concept of relative motion, corresponding mainly to the wave laws, it seems appropriate to turn to the simplest case of wave perturbation propagation on the free surface of water to refresh our understanding of the physics of wave processes. For this purpose, let us project a rectangular system of coordinate axes onto the perturbed water surface so that the $\boldsymbol{X}$ axis indicates the direction of phase velocity, the $\boldsymbol{Y}$ axis was located along the wave propagation front, and the $\boldsymbol{Z}$ axis went into the coordinate dimension perpendicular to the $\boldsymbol{X}$ and $\boldsymbol{Y}$ axes (Fig. 3).

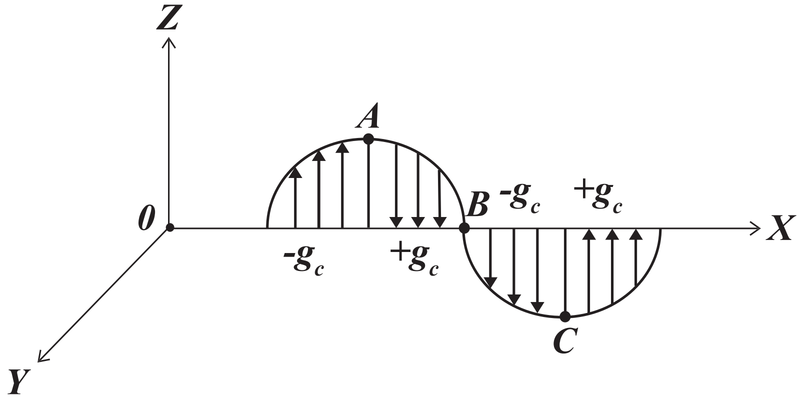

Fig. 3

In the general case, the propagation of wave perturbations over the free water surface is accompanied by curvature of the two-dimensional mirror into the third dimension. Observation of the control point on the perturbed water surface, in the Cartesian coordinate system, shows that the corpuscular motion, implying the direct transfer of matter from one region of space to another, occurs only in one dimension, along the $\boldsymbol{Z}$ axis. In the direction of the $\boldsymbol{X}$-axis the movement of water mass is not observed at all, but this circumstance does not prevent the occurrence of the phase velocity of the running wave exactly in this direction.

The displacement of the reference point on the perturbed water surface is characterized by its acceleration relative to the calm mirror, with negative and positive signs. Acceleration in Figure 3, occurs by the pointing arrows, and for "gravity" waves, without taking into account the surface tension forces, is equal to the free-fall velocity in the given gravitational field. There are simple calculations by which, knowing the phase velocity of the wave perturbation propagation along the ***X***-axis and accelerations along the ***Z***-axis, one can find the function of the flat ***ABC*** wave packet labeled at the points of maximum development relative to the ***Z***-axis.

To this we can add that, knowing the characteristics of the planar wave packet ***ABC***, in particular its length, and establishing the gravitational potential, we can always find the value of the phase velocity of the wave perturbation propagation on the free surface of water. Thus, for "gravity" waves, the phase velocity is determined as follows:

$$V_{фаз} = \sqrt{\frac{g\lambda}{2\pi}} \qquad \textbf{(4.2)}$$

Here g is the gravitational potential, λ is the wave packet length.

From the obtained picture of the propagation of wave perturbations on the free surface of water, we highlight the following fundamentally important points.

First of all, let us take into account that a complex combinatorics of three velocity or dynamic factors is triggered by wave disturbances on the free water surface. The first velocity factor is the phase velocity of propagation of the wave disturbance along the ***X***-axis. The second velocity factor is the acceleration along the ***Z*** axis. The third, critically important velocity factor is the momentum of the primary momentum that causes the occurrence of wave perturbation along the ***Z*** axis. Let's assume the moment of falling of a stone on the calm surface of water. Establishment of the third velocity factor requires special attention. Exactly at this moment some initial velocity of the wave perturbation along ***Z***-axis is set, which at first is dampened by the gravitational potential, and then, having passed the zero point, it increases up to the former, ideally the initial value. We understand that the acceleration of the reference point on the surface of the traveling wave along the ***Z***-axis always corresponds to the gravitational potential, but here the initial velocity of the negative acceleration and the final positive one always correspond to the phase velocity of the traveling wave. Thus, the phase velocity of the wave perturbation is also the momentum of the primary momentum which causes the occurrence of the wave perturbation along the ***Z***-axis.

Among other things, we must recognize that the planar wave packet ***ABC*** arising during the propagation of wave disturbances on the free surface of water, in fact, acts as an extreme metric key, according to which the curved water surface is calibrated. Defining the flat wave packet ***ABC*** as an extreme metric formation, we are based on the fact that the category "wave" is an indivisible quantity. Mathematically you can conditionally decompose the wave function into separate fragments, but this procedure cannot be translated into a real physical embodiment. No matter how sophisticated experiments we manipulate, we will never be able to obtain a part of a wave, much less its point. A wave exists only as a whole, quantum formation, so on the perturbed surface of water a flat ***ABC*** wave packet is an extreme, not amenable to further fragmentation.

In order to establish the configuration of the desired wave function, by which the relative motion is calibrated on the basis of wave patterns, we need to consider the process of movement of a material object within the framework of the temporal component of the Minkowski equation. That is, to describe the relative motion as a result of wave perturbation propagation in a three-dimensional coordinate system that satisfies the dimensionality of the expression $(ct)^2$. In doing so, we will use the useful experience learned from observations of wave perturbations on the free surface of water.

This experience convinces us that the emergence of the planar wave packet ***ABC***, according to which the wave perturbation on the free surface of water is calibrated, is accompanied by the presence of three fundamentally important dynamic, or velocity factors. It is natural to assume that the emergence of the wave function, according to which the relative motion is calibrated in time metric terms, is also associated with the action of three pronounced velocity factors.

In Figure 4, a wave function corresponding to the expression $(ct)^2$

is unfolded in a three-dimensional coordinate system bearing on its axes the metric markings ***m,sec,sec***. The metric structure of this coordinate system corresponds to the topology of the two laboratory instruments — light signal on the ***X/t*** axis and chronometer on the ***t*** axis.

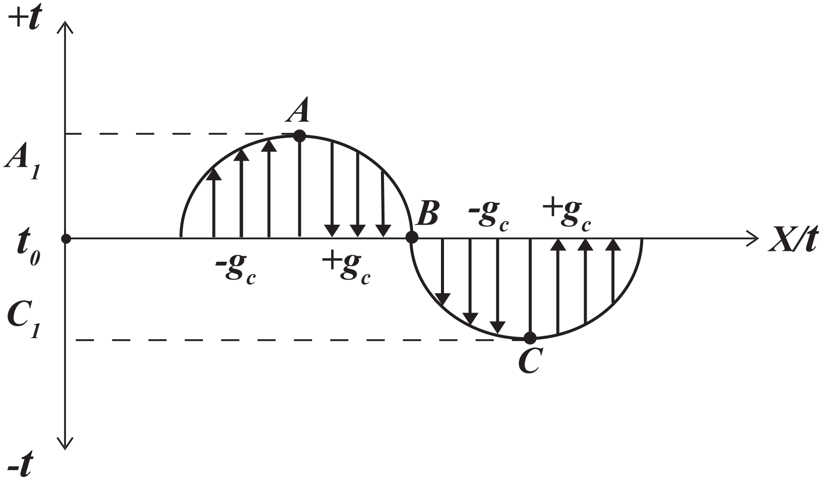

Fig. 4

In the presented figure we illustrate the wave perturbation of material space in only one temporal dimension. The second temporal dimension we consciously combine with the spatial coordinate axis, together they are identified with the speed of light in a vacuum. The fact is that in the course of inertial motion the wave perturbation occurs only in one temporal dimension. Whereas in the course of accelerated motion the wave perturbation of material space is realized in two temporal dimensions. Since the wave perturbation in both time dimensions proceeds absolutely symmetrically, it is more convenient for clarity to consider the process of wave perturbation of spatial matter in the coordinate system shown in Figure 4. We will keep in mind that just on such a flat wave packet the inertial motion is calibrated.

So, the coordinate system presented in Figure 4 consists of a two-bit coordinate axis ***X/t***, identified with the trajectory of the light signal, and the coordinate axis of time ***t***. In the positive direction, the time axis ***t*** corresponds to the quality of the future time, in the negative direction it corresponds to the quality of the past time, and only at the point t_0 (the point where the coordinate axes intersect) is the quality of the present moment of time concentrated. The peculiarity of the chronometric version of the temporal coordinate axis ***t*** consists in the fact that the qualities of the past, present and future times contained in it act as equal arguments. In the sense that any time series projected on the time axis will consist of equal points, without any exclusivity.

The figure clearly shows that the wave perturbation of spatial matter in the time dimension ***t***, in the course of the relative motion, occurs in the direction of the quality of future and past time. The wave perturbation is accompanied by acceleration of the control point on the surface of the wave function along the time axis. Just as with wave perturbations on the free surface of water, this acceleration, depending on the direction, can take a positive or negative value, but is always equal in magnitude to the speed of light in a vacuum ($+g_c$ or $-g_c$)). Let's note this acceleration as the first velocity index from the necessary set of three velocity factors accompanying the appearance of wave perturbation in the course of relative motion.

The initial velocity of the negative and final positive acceleration along the time axis corresponds to the phase velocity of the material object in the time metric plane of the adopted **PS-TC**. Let us define the phase velocity ***υ*** - as the second velocity factor, which determines the origin of the wave perturbation. The velocity of the wave perturbation along the ***X/t*** axis is equal to the speed of light in the vacuum and is the third velocity factor necessary for the origin of a full wave packet.

Here, in the figure, we highlight three critical points of the full cycle of the wave function development along the ***t***-axis. Points ***A, B*** and ***C*** represent a flat wave packet, which arises when the material object moves in the time metric plane of the adopted **PS-TC** and which is an extreme metric formation at a given wave perturbation. Keeping in mind that this wave packet is a quantum quantity that does not lend itself to further fragmentation.

A is the amplitude of the plane wave packet ABC; its projection onto the time axis t (distance A_1C_1) is provided with the time dimension and is determined by finding the calculation.

$$A = \frac{c - \sqrt{c^2 - v^2}}{g_c} \tag{4.3}$$

Here c is the speed of light in vacuum; v is the phase velocity of the wave motion of a material object in the time metric plane of the adopted **PS-TC**, it also accounts for the primary momentum speed for the acceleration of the reference point of material space; g_c is the negative and positive acceleration speed of the reference point of the wave function in the time coordinate dimension, equal in magnitude to the speed of light in vacuum.

At $v = 0$ the solution of equation **(4.3)** is reduced to zero, which agrees with the theoretical premise about the emergence of a flat ABC wave packet, due to the displacement of the material object in the time metric plane of the adopted **PS-TC**. At $v = c$, the amplitude of the wave packet reaches its maximum value, equal to one. If the velocity of relative motion exceeds the light velocity $v > c$, the initial velocity of negative acceleration along the t-axis, which is the primary impulse of the wave perturbation, will exceed the speed of the acceleration itself and the wave perturbation will not occur in the temporal metric plane of the adopted **PS-TC**. The moving material object as if will skip in the accepted space-time continuum without registration, because it does not have time to form a flat wave packet ABC, on which the wave perturbation is calibrated. That is why the theory of relativity imposes restrictions and forbids the increase of relative velocity above the light velocity. Of course, moving of material objects relative to each other can occur with any high speeds. Only that material object, the relative velocity of which does not exceed the light velocity, can register in concrete **PS-TC**, i.e. to pass the state of wave perturbation in its temporal metric plane.

The flat ***ABC*** wave packet presented in Figure 4, in fact, is the geometric justification for the operation of the wave concept of relative motion, based on the temporal component of the Minkowski equation. In accordance with the requirements of the wave theory of relative motion, a wave perturbation of the material platform of the moving object in the temporal metric plane of this **PS-TC**occurs during a uniform and rectilinear motion of a material object in the accepted space-time. This wave perturbation is calibrated according to the configuration of the flat ***ABC*** wave packet adequate to the argument $(ct)^2$. For accelerated kinds of relative motion, the configuration of the ***ABC*** wave packet is transformed from a flat geometric expression into a curved one, but in this context we are talking only about inertial motion.

Remembering that the category "wave" is an indivisible quantity, we must consider the planar wave packet ***ABC*** depicted in Figure 4 as an indivisible quantum of the event, since it is an extreme geometric formation that is not subject to further fragmentation. Knowing the characteristics of this event quantum, we can determine the relative velocity of motion of a material object in the adopted **PS-TC**.

The latter follows directly from equation **(4.3)**:

$$\upsilon = \sqrt{A\, g_c (2c - Ag_c)} \qquad \mathbf{(4.4)}$$

Let us illustrate the origin of the equation (4.4):

$$A = \frac{c - \sqrt{c^2 - \upsilon^2}}{g_c}$$

$$Ag_c = c - \sqrt{c^2 - \upsilon^2}$$

$$\sqrt{c^2 - v^2} = (c - Ag_c)^2$$

$$c^2 - v^2 = (c - Ag_c)^2$$

$$c^2 - (c - Ag_c)^2 = v^2$$

$$c^2 - (c^2 - 2cAg_c + A^2g_c^{\,2}) = v^2$$

$$\cancel{c^2} - \cancel{c^2} + 2cAg_c - A^2g_c^{\,2}$$

$$Ag_c\,(2c - Ag_c) = v^2$$

$$v = \sqrt{A\,g_c\,(2c - Ag_c)}$$

As it was already noted, our ideas about relative motion, according to quantum laws, must satisfy the requirements of corpuscular-wave dualism. Therefore, we cannot present a complete description of it, using only corpuscular or wave kinematics of relative motion. When the subject of observation is the relative motion of a material object in the accepted **PS-TC**, we must combine the elements of the two ways of realization of motion and come to a common resultant. To combine so that relative motion in the spatial metric plane is realized according to corpuscular laws, and in the temporal metric plane according to wave laws. This, as if averaged, corpuscular-wave characteristic of relative motion is suggested by the famous equation of Hermann Minkowski. According to this equation, the true relative velocity of motion of a material object in the adopted **PS-TC** is given by the difference between the characteristic of the plane wave packet, according to which the relative motion is calibrated in the temporal metric plane, and the spatial interval, which is the result of relative motion in the spatial metric plane.

In order to better imagine how in reality the wave and corpuscular signs of relative motion are combined, it makes sense once again to refer to the well-known aporia of Zeno with a flying arrow. Consider the situation when the tip of a flying arrow consistently passes nearby points $\boldsymbol{A}$, $\boldsymbol{B}$ and $\boldsymbol{C}$ in the accepted personal space-time continuum.

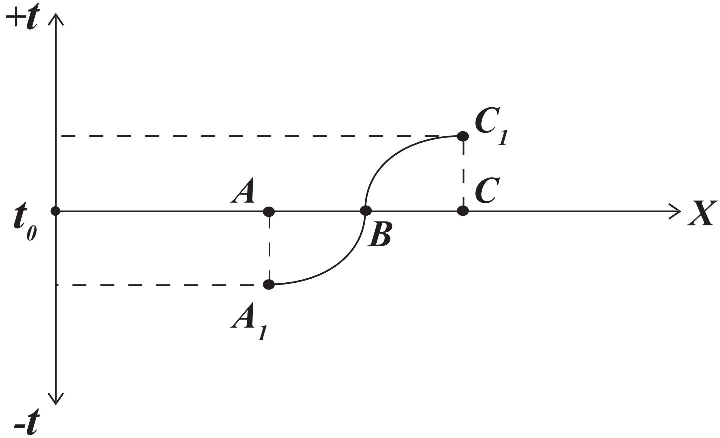

Рис. 5

For this purpose, let us enter the trajectory of the zenon boom flight into a two-dimensional coordinate system consisting of one spatial coordinate axis $\boldsymbol{X}$ and the time axis $\boldsymbol{t}$ (Fig. 5). In reality, the realization of the flight of the zenon arrow with respect to the accepted **PS-TC** takes place in a six-dimensional geometric manifold. To make our reasoning clear, we use only one coordinate axis $\boldsymbol{X}$, borrowed from the spatial metric plane, and the time coordinate axis $\boldsymbol{t}$, borrowed from the temporal metric plane of the adopted **PS-TC**.

However, we will always keep in mind that we have in front of us a combined space-time coordinate system in which both corpuscular and wave signs of motion are realized.

The logical reasoning suggested by Zeno, according to which at the moment when the point of the flying arrow is at point $\boldsymbol{B}$ it is no longer at point $\boldsymbol{A}$, but it is not yet at point $\boldsymbol{C}$ (Fig. 5), is based on classical ideas about absolute space and time. The ancient philosopher saw relative motion solely in corpuscular terms. In fact, in accordance with quantum laws, the statement that at some fixed moment of current time the tip of flying arrow is at point $\boldsymbol{B}$ has no real physical meaning. Based on the wave concept of relative motion, at any fixed moment of current time, the arrow tip is objectively present simultaneously on the whole wave function $\boldsymbol{A_1BC_1}$, acting as an indivisible quantum of relative motion.

With the only reservation that on the segment from $\boldsymbol{A_1}$ to $\boldsymbol{B}$ the flying arrow tip is present as the past tense, on the segment from $\boldsymbol{B}$ to $\boldsymbol{C_1}$ — as the future tense, and only at point $\boldsymbol{B}$ the location of the flying arrow tip corresponds to the quality of the present moment of the current time. It should be clearly understood that the tip of the flying arrow is simultaneously and objectively present throughout the wave function $\boldsymbol{A_1BC_1}$. It is the wave laws that forbid us to break these temporal qualities, due to the fundamental impossibility of separation of the wave packet $\boldsymbol{A_1BC_1}$ into separate independent fragments.

Thus, all the paradoxes formulated by Zeno in his famous aporia stem from a misunderstanding of the nature of motion. As soon as we take the notion of "event" beyond a point and give it a quantum space-time definition, these paradoxes will be solved by themselves.

Relativistic effects are reliable evidence in favor of the fact that motion of material objects in the accepted **PS-TC** is realized according to corpuscular-wave laws. In particular, the Lorentzian contraction of the registered length of a moving object. In fact, if we put a sheet of newspaper page on the perturbed water surface, we can make sure that the projection of the sheet of paper on the coordinate axis, indicating the direction of the phase velocity of wave perturbation propagation, will be shorter than the length of the sheet in a free state. The greater the phase velocity, the greater the curvature of the wave perturbation and the shorter will be the projection of the length of the paper page. Similarly, the projection of the length of a material object moving in the adopted **PS-TC** on the spatial coordinate axis indicating the direction of relative velocity will be shorter than the length of the same object at rest.

Figure 6 shows, in a two-dimensional space-time coordinate system, the geometrical dependence of the Lorentz contraction of the flying arrow length with respect to the amplitude value of the plane wave packet, by which the relative motion is calibrated. Just as in the previous experiment with the flying arrow, to make our reasoning clear, we borrow one spatial coordinate axis X and the time axis t from the six-dimensional metric manifold corresponding to the metric of the adopted **PS-TC**. As a result, we obtain a combined space-time coordinate system depicted in our figure.

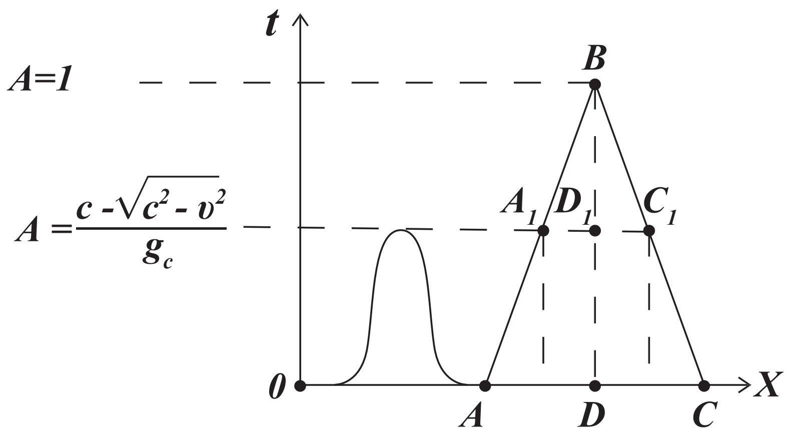

Fig. 6

Let the distance AC on the axis X corresponds to the length of the flying arrow at rest — $L°$. The hips of triangle ABC bear all possible dimensions of the relativistic length of the flying arrow projected to the X axis, depending on the value of the relative velocity. We mean any distance A_1C_1 parallel to AC, in the range from the base of triangle AC to its vertex. This distance decreases as point B is approached. The value of the length of the flying arrow recorded by a stationary observer is determined by the amplitude of the plane wave packet, represented in our figure by a small wave function. The amplitude of this wave packet, distance DD_1, just marks the level of spatial agreement, the projection of the flying boom length on the X-axis. The greater the relative velocity, the higher along the t-axis the amplitude of the wave packet will rise and the shorter the distance A_1C_1 will be, corresponding to the projected length of the flying boom on the X-axis. For example, at $v = c$, the amplitude of the plane wave packet, by which the relative motion is calibrated, will reach its maximum value equal to unity. Then the relativistic length of the flying arrow projected on the X-axis will be reduced to point D, which is practically equal to zero.

To determine the relativistic length of the flying arrow it is necessary to find the distance A_1C_1 in Figure 6. This is done as follows:

$$\frac{AC}{BD} = \frac{A_1C_1}{BD_1}; \qquad A_1C_1 = \frac{AC \cdot BD_1}{BD}$$

$$A_1C_1 = \frac{AC \cdot (BD - DD_1)}{BD} \tag{4.5}$$

Let us rewrite (4.5) as:

$$L = L^{\circ} \cdot \frac{\Delta t - \dfrac{c - \sqrt{c^2 - v^2}}{g_c}}{\Delta t} \tag{4.6}$$

We define g_c in equation **(4.6)** as the change in velocity per unit time and make the necessary substitution. Then:

$$L = L° \cdot \frac{\Delta t - \dfrac{c - \sqrt{c^2 - v^2}}{c}\Delta t}{\Delta t} =$$

$$= L° \cdot \left(1 - \frac{c - \sqrt{c^2 - v^2}}{c}\right) = \qquad \textbf{(4.7)}$$

$$= L° \cdot \left(1 - 1 + \frac{1}{c}\sqrt{c^2 - v^2}\right) =$$

$$= L° \cdot \sqrt{\frac{c^2 - v^2}{c^2}} = L° \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

As we see, as a result of these calculations we come to the Lorentzian transformation of the length of the flying arrow, which was used by Einstein in his theory of relativity.

5. INERTIA

Some time ago, quite a long time ago, the author of these lines was deeply sympathetic to the famous trouble that befell the great Isaac Newton, who was dozing in the shade under an apple tree. I felt so deeply that I decided to thoroughly understand: how does the potential energy of an apple hanging on a tree turn into kinetic energy as a result of falling? What is the real physical difference between these two fundamentally separate states of an apple — the state of rest and uniform acceleration? What is the process itself, not in mathematical, but precisely in physical terms, according to which the real transformation of energy takes place?

Further, following the scenario of Newton's adventure, the kinetic energy of the accelerating apple, having met the genius thinker's head, is divided into many kinds of different energies, including, for example, thermal energy. Here, again, I really wanted to draw for myself a visual picture of all these complex metamorphoses that happen with the kinetic energy of the fallen apple. I wanted to thoroughly decompose and comprehend the true essence of hidden inner processes accompanying the fall of an apple. After all, if different kinds of energies are really present in the nature, they must have an original physical design available to our imagination.

We, of course, have great respect for all Nobel Prize winners in physics, all together and individually. At the same time one can be surprised to find out that if to memorize, like a multiplication table, all grandiose works of honored scientists, it will not allow to answer a simple question: what physical, i.e. material, expression has a difference between an apple with potential energy and an apple with kinetic energy? And to answer this innocent question not with the help of abstract coordinate-signs or conventional physical symbols, but to reveal the real difference between potential and kinetic energy inherent in the mass of any body by nature itself. In other words, to explain how and in what form the concentration and transformation of energy occurs in the apple itself as a result of its fall.

We understand that any mechanics, which pretends to be a full-fledged theory of motion, must be, first of all, a theory of matter and be able to explain the main property of matter — inertia. For this purpose it should have an effective conceptual arsenal capable of presenting an adequate attribution of the fundamental categories of the universe in order to be able to fully describe their physical contribution to various states associated with changes in the kinematics of motion.

As a matter of principle, we can point to four completely separate states of a test mass of matter in the accepted personal space-time. Each of these four states will be marked by an independent dynamical load different from the other possible states. Let us give these states and call them "the four problems of the Newtonian apple".

The first state consists in the situation when an apple hangs on a branch of a tree and keeps its resting position relative to the Earth. The physical content of such a state is determined by the interaction of the control apple with the Earth's gravitational field. As a result, a stock of potential energy arises in the apple suspended on the tree. Unfortunately, we do not know where and in what form this energy is stored.

The second state of an apple can be registered during its free fall in earthly personal space-time. In this situation the apple is as if released from the embrace of the world gravitation and agrees to its metric settings. But at the moment of detachment of the apple from the tree there is a mysterious conversion of potential energy into kinetic energy. What happens at this moment with the control apple, how the conversion of potential energy to kinetic energy is carried out — we do not know.

The third state, at one time attested by Isaac Newton, is manifested at the moment of contact of the falling apple with its head. At the same time, kinetic energy is released from the falling apple, which is converted into impact energy, thermal energy, sound energy, etc. That is, the kinetic energy of the falling apple is sort of disintegrated into many kinds of different energies. Again, we don't know how this energetic transformation takes place. Because we don't know in what form or in what form the energy was accumulated in the falling apple before it split into many different energies.

The fourth state of the apple is associated with the forced communication of acceleration, when Newton heartily throws away the unfortunate apple, which painfully struck him on the head. Here, too, an energy exchange takes place. Newton's energy is transferred to the thrown apple and acquires in it the quality of kinetic energy. We need to explain, with the help of real physical arguments, how, with the help of what transformations Newton's energy was transferred to the thrown apple.

Any of the above four states associated with the presence of the control apple in the Earth's **PS-TC** is marked by individual physical features. A full-fledged theory of relative motion must give each of these states an adequate accompanying application. It must intelligibly explain how energy reincarnation occurs in these mental experiments. And to do this not only in mathematical language, but necessarily with the help of conceptual formulations accessible to our comprehension.

Surprisingly, modern scientific thought does not have any satisfactory theory of motion, which would allow comprehension of at least one of the four above-mentioned apple states. If we somehow manage to reach a complete understanding of at least one of these states, such a theoretical construction could be the universal key to creating an exhaustive theory of relative motion. Because it will open a real possibility to explain all other dynamical states of the apple, connected with its presence in the terrestrial **PS-TC**.

It is known that Newtonian mechanics, with its famous laws, offers a satisfactory mathematical solution for any of the above states associated with the presence of an apple in earthly personal space-time. But this is done in a special conceptual system consisting of material points acting at a distance and absolute empty space, with the same absolute, everywhere uniformly flowing time. The weakness of classical mechanics is due, firstly, to the insufficiency of the conceptual arguments on which it relies. No mathematical points and differential intervals between them really have anything to do with the fundamental categories of the universe. Therefore, they cannot be regarded as real physical equivalents accompanying the actual process of relative motion. Secondly, the mathematical apparatus of Newtonian mechanics is not adapted to the Lorentzian transformations, the value of which, as the value of relative velocity increases, becomes very significant.

Within the conceptual arsenal used by Newton, in fact, there are no any effective preconditions for the solution of at least one of the four problems arising from the presence of the control apple in the Earth **PS-TC**. The point is that the methodology of considering a massive material object as a material point absolutely excludes a positive result of searching productive ideas, according to which an apple can be considered as an energy carrier. Indeed, what can be said, from a physical point of view, about an apple hanging on a tree, carrying potential energy in itself, if this apple is represented as a material point and if the amount of energy depends only on the distance from the Earth. How can we indicate where and in what form this energy is concentrated when we have only points and distances between them instead of a real picture of the natural processes taking place in nature?

Later Einstein, appreciating all the triviality and limited range of applicability of Newtonian mechanics, developed and proposed its updated version. With its special system of concepts consisting of a continuous space-time field and, again, material points substituting for massive material objects of matter. Einstein's equations of motion are much more accurate than Newton's, but they are also meaningless in the sense that they do not contain expressions of force and energy that we can understand. If these expressions do exist, they involve considerable arbitrariness. Because the exponent of force and energy in the Einsteinian equations depends only on the time derivatives of the coordinates. In any case, the theory of relativity is nothing more than a geometric scheme of the distribution of the same mathematical points substituted for the actual control masses of matter. Bare scheme, plotted on a four-dimensional coordinate grid, imitating four-dimensional space-time.

Relativity theory, like Newtonian mechanics, offers no promising ideas to explain the difference between an apple suspended on a tree and an apple in a state of free fall. From a physical point of view, though, these are two quite different masses of matter in terms of their intrinsic content. One of them contains potential energy, the other — kinetic energy. Until we objectively establish how the transition from one type of energy to the other is carried out, no full-fledged theory of relative motion is out of the question. Under the conditions of the point representation of the material mass of matter, such a problem cannot be solved by definition. No boldest imagination can imagine a mathematical point as a carrier of energy, much less as a springboard for all kinds of reincarnations.

In order to predict what the supposed perfect theory of motion should be, let us carefully analyze one of the abovementioned four problems related to the presence of the control apple in the Earth's personal space-time continuum. Let us pay attention and analyze the situation when Newton throws away the apple that fell on his head. Let us try to understand in what form the force of Newton was transferred to the unfortunate apple. After all, at the moment of acceleration Newton gives the apple kinetic energy. Energy, whether we want it or not, is not a mathematical concept, but exclusively and only physical, and therefore simply must have a material theoretical support. Consequently, we have to learn to describe the real process of acceleration of an apple with the help of conceptual physical arguments instead of some dependences from recalculation of abstract coordinate-signs.

Newton's problem of energy transfer to the apple he threw can be reformulated as a problem of unwillingness of mass to move in response to a force. For example, the Austrian scientist Ernst Mach believed that inertia-the unwillingness of mass to move in response to a force-could be explained by the joint attraction of all matter in the universe. In this case, the mass of a material object is not something inherent in it, but depends on the distribution of masses in the surrounding universe. If the substance in outer space will be distributed unevenly, then the magnitude of inertia will be different in different directions. This hypothesis is called the Mach Principle. To illustrate his reasoning, Mach proposed mental experiments with a classical cosmonaut. Let's recall one of these experiments.

Let us imagine the Universe with a single material object. Let it be the ill-fated Newtonian apple, which, as we have found out, has its own personal space-time continuum in the absolute womb space of the Universe. The apple's center of mass is organically connected with the starting point of its **PS-TC**. In the absolute uterine space they act as a single physical system "material object — personal continuum".

Let us illustrate such a physical system in Figure 7:

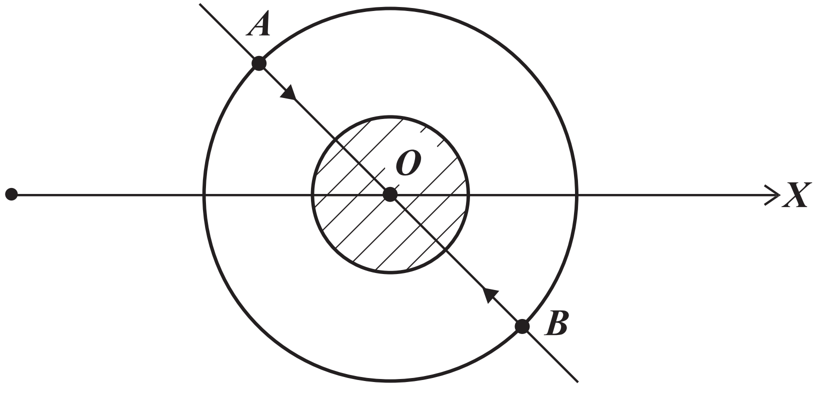

Fig. 7

In Figure 7, the small shaded circle denotes a Newtonian apple. The two opposite directions, ***AO*** and ***BO***, denote arbitrarily marked trajectories along which the mother matter of absolute space flows into the limits of the apple's mass. Let us take the apple as a source of electromagnetic waves (a source of light) and describe in its personal space-time continuum a conditional circle drawn at the front of propagation of light waves. Keeping in mind that the radius of ***OA*** is equal to an inverse second, i.e. the distance travelled by light in one second.By analogy with Figure 7, let's construct a working model shown in Figure 8:

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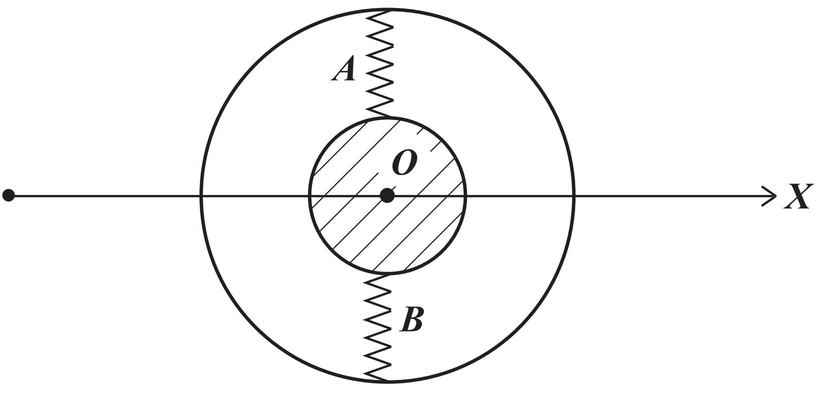

Fig. 8

This model consists of an aluminum hoop, in the geometric center of which, on two springs ***A*** and ***B***, an experimental apple is suspended. The analogy between the two physical systems shown in Figures 7 and 8 is that both are flexible structures. Any kinematic manipulation of the experimental apple in Figure 8 cannot instantly propagate throughout the model. The response of the aluminum hoop, to changes in the relative velocity of the experimental apple, will occur with some lag, depending on the degree of elasticity of the springs. Similarly, the limitations imposed on the speed of propagation of light signals in the adopted **PS-TC** make the physical system "material object — personal continuum" as flexible as our working model.

Among other things, both of these constructions are organically inherent in the aspiration to a balanced equilibrium state. According to which the experimental apple should be in the geometrical center of the aluminum hoop, just as the Newtonian apple should be in the center of its **PS-TC**. We will duplicate all forthcoming mental experiments with the Newtonian apple in the empty Universe on our working model. This will ensure that the forthcoming reasoning will be clear and its arguments will be convincing.

Suppose that a classical cosmonaut swims up to a Newtonian apple in the empty Universe and starts to move it with uniform velocity along a straight axis $\boldsymbol{X}$ (Fig. 7). Since our mental experiment takes place in empty space (in the absence of any other material objects), the $\boldsymbol{X}$-axis is an idealized geometric direction not related to any real body of reference. Let at some moment of time a classical cosmonaut sends a light signal from a Newtonian apple moving along axis $\boldsymbol{X}$ to the place of a large circle conventionally circumscribed along the front of light wave propagation in his personal space-time continuum. Let's analyze, how this mental experiment is realized. And let's find out whether the equilibrium state of physical system "material object — personal continuum" is broken.

We understand that the starting point of any personal continuum is organically connected with the center of the material mass, which determines the presence of this **PS-TC**. Then, if a Newtonian apple moves uniformly with a certain speed along the idealized axis $\boldsymbol{X}$, it is followed by its personal space-time continuum with the same speed. Of course, together with the circle, which is described along the light wave propagation front.

To be sure of this, it is necessary to duplicate the present mental experiment on our working model. It is obvious that when the experimental apple moves uniformly along the axis $\boldsymbol{X}$ (Fig. 8), the physical system "control apple-aluminum hoop" will keep exactly the same appearance as if it were at rest.

Now suppose that a classical cosmonaut swims up to the Newtonian apple and starts to give it uniform acceleration along the idealized ***X***-axis (Fig. 9).

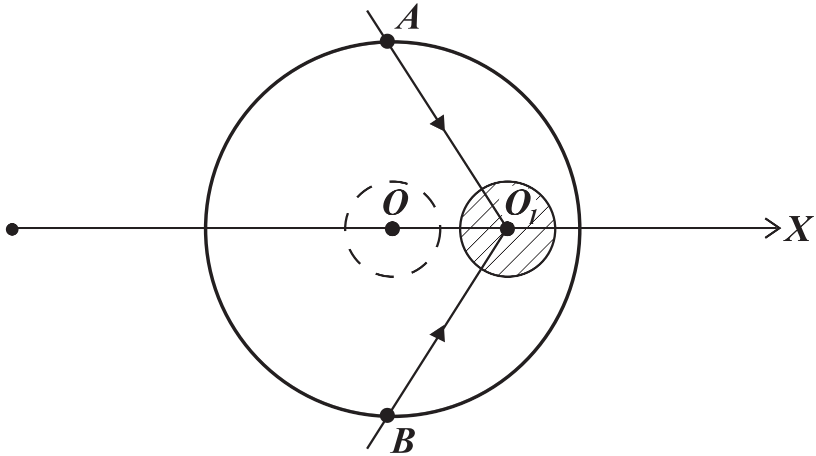

Fig. 9

Let at some moment of time the cosmonaut will send a light signal from the accelerating apple to the place of the circle circumscribed along the light wave propagation front. Let us analyze how the proposed mental experiment will reflect on the general state of the physical system "material object — personal continuum". And we will try to find out, what will be the character of relations between the center of mass of the Newtonian apple and the geometrical center of its **PS-TC**.

It is known that the restrictions imposed on the velocity of light signals propagation give the physical system "material object-personal — continuum" quality of flexible construction. Any dynamic manipulations associated with acceleration of a Newtonian apple will not be able to propagate instantly throughout the represented physical system. If a classical cosmonaut, under the action of his force, begins to change the relative velocity of movement of the Newtonian apple along the idealized ***X***-axis, such a change of velocity will not be able to instantly span the entire personal space-time continuum of the control apple. While the light signal sent by the classical cosmonaut will cover the distance $\boldsymbol{OA}$ (Fig. 9) to take the place of the circle which is described along the light wave propagation front, the center of mass of the apple will shift by some distance along the motion, from point $\boldsymbol{O}$ to point $\boldsymbol{O_1}$.

Thus, as a result of the cosmonaut's force, the apple's mass leaves the geometrical center of the circle circumscribed along the light wave propagation front in its own **PS-TC**. This means that the presented physical system "material object — personal continuum" turns out to be removed from the equilibrium state. As soon as the cosmonaut's force pressure on the Newtonian apple stops, the physical system "material object — personal continuum" will immediately rush to the balanced equilibrium state. Then the apple's center of mass will also be the geometrical center of its **PS-TC**. It is this aspiration of the physical system "material object — personal continuum" to the balanced equilibrium state that causes reluctance of any mass to move in response to a force action. A similar mental experiment can be duplicated on our working model. It will unambiguously demonstrate that the acceleration of the experimental apple along the $\boldsymbol{X}$-axis will cause its mass to be displaced from the geometric center of the aluminum hoop.

To sum up some intermediate summary, we can conclude that, with respect to Mach's principle, all bodies possessing a rest mass resist in response to a force. Regardless of the presence of other masses in the surrounding universe. This unwillingness of a test body to submit to an external force is due to the desire of the physical system "material objec — personal continuum" to an equilibrium state. The force, which is applied to the accelerating object, just takes the control mass of the matter out of the geometrical center of its own **PS-TC**. The more significant is the mass of the investigated object, the stronger are the internal connections controlling the physical system "material object — personal continuum" in the equilibrium state, and the more efforts are needed for its unbalancing.

However, let us continue our mental experiments with the

Newtonian apple and transfer them from the empty Universe closer to the real conditions. In other words, we will consider various dynamical states of the apple not relative to the idealized ***X***-axis, but relative to our earthly **PS-TC**. The peculiarity of the forthcoming experiments is that describing the kinematics of the Newtonian apple as applied to real conditions, we will deal not with one but with two personal space-time continuums. We mean the external earthly personal continuum connected with the mass of our planet, and the apple's own personal space-time itself. Indeed, we have already stated earlier that any material object possessing a rest mass has its own **PS-TC** in the Universe space.

In accordance with the position on equality and equivalence of all personal continua, we can use both the external terrestrial **PS-TC** and its own personal space-time to describe the motion of a Newtonian apple. In this case, we will be able to reason, on the one hand, about the velocity of the experimental apple's motion relative to the external terrestrial **PS-TC**. Then we will construct a wave packet by which this relative motion is calibrated in temporal topological terms, say, at the level of the light-bearing ordinator of external personal space-time. On the other hand, we can describe the relative velocity of the Newtonian apple involving its own **PS-TC** and construct the wave packet at the level of the luminosity ordinator of personal spacetime of the apple itself.

Let the classical cosmonaut inform the Newtonian apple of some uniform and rectilinear velocity not relative to the idealized ***X***-axis, but relative to the external personal space-time continuum connected with the mass of our planet. Let's try to figure out how such a mental experiment should be interpreted.

It is known that during the inertial motion of the Newtonian apple relative to the external **PS-TC** the wave perturbation of the local region of the accepted personal space-time, which is the real material platform of the moving object, takes place. Wave perturbation proceeds in the temporal metric plane of the adopted **PS-TC** and is accompanied by the emergence of a flat wave packet, according to which this relative motion is calibrated. Knowing the characteristics of this wave packet, acting as an indivisible quantum of the event, we can find the phase, as well as the relative velocity of the Newtonian apple relative to the external **PS-TC**.

If we consider the inertial motion of a Newtonian apple from the point of view of its own **PS-TC**, it appears that this relative velocity cannot be registered in the personal space-time of the apple itself. It follows from the results of previous mental experiments that at uniform and rectilinear motion of the experimental apple along the idealized X-axis the physical system "material object — personal continuum" preserves exactly the same form as if it were at rest. This means that during the inertial motion of the Newtonian apple in its own personal space-time there is no wave perturbation at all and there is no possibility to speak about emergence of the wave packet by which the relative velocity is calibrated. All together allows us to make the first fundamentally important generalization. In accordance with which the inertial motion of a material object in the external personal space-time is identical to the rest state of the same object in its own **PS-TC**.

Now suppose that the classical cosmonaut begins to communicate to the Newtonian apple a uniform acceleration. Let us try to trace the process of realization of the apple's acceleration with respect to both the external and the own **PS-TC**.

We have established that in the course of inertial motion the Newtonian apple preserves the state of rest in its own **PS-TC**, but moves relative to the external personal space-time. Meanwhile, when the Newtonian apple is given some uniform acceleration, the position changes radically. Now the mass of the control apple moves not only relative to the external personal space-time continuum, but also relative to its own **PS-TC**. However, it should be noted that the Newtonian apple moves with uniform acceleration with respect to the external **PS-TC**. Moreover, the wave packet arising in the temporal metric plane of the terrestrial **PS-TC** and by which the acceleration is calibrated, acquires a three-dimensional curved configuration, because the perturbation occurs simultaneously along two temporal dimensions. Whereas the apple moves at a constant and uniform speed relative to its own personal space-time. Hence, the wave packet by which this velocity is calibrated will have a flat two-dimensional configuration.

This inevitably leads to the second, symmetric to the first, fundamentally important generalization. According to which acceleration of a material object relative to the external **PS-TC** is identical to its uniform and rectilinear motion relative to its own personal space-time. This fundamental identity, between the acceleration of a test body in the external personal continuum and its uniform motion in its own personal space-time, will further serve as the guiding idea leading to the understanding of the nature of the universal gravitation.

Suppose a classical cosmonaut stands on the roof of a high-rise building and holds a Newtonian apple in his hand. The apple, as it is known, has in the absolute space of the Universe its own **PS-TC**. The proposed mental experiment takes into account the fact that the combined physical system "Newtonian apple — personal continuum" is placed in the personal space-time continuum of planet Earth. Let the cosmonaut, at some point in time, send a light signal from the control apple. Let us consider how the light signal propagation is realized from the point of view of Earth's **PS-TC** and from the point of view of personal space-time of the apple itself. For this purpose let us turn to Figure 10:

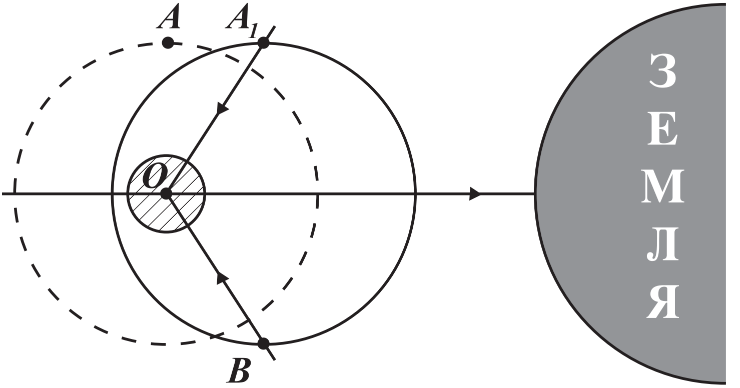

Fig. 10

Figure 10 shows a Newtonian apple with the center of mass at point $\boldsymbol{O}$. A large dotted circle, with the geometrical center at point $\boldsymbol{O}$, is described along the light wave propagation front in the personal space-time continuum of the Newtonian apple. Such a relation between the center of mass of a material object and the geometrical center of its **PS-TC** is typical for the case when the physical system "material object — personal continuum" is in the equilibrium state. The $\boldsymbol{OA}$ radius is equal to an inverse second, i.e. the distance that the light signal covers in one second.

At the Earth's surface, the mother matter of absolute space moves towards the center of its mass with a speed of ***9,8 m/sec***, in full accordance with the solution of equation ***(3.2)***.

Let's present this equation again:

$$\boldsymbol{\upsilon = \gamma^{«D»} \frac{M}{R^2}} \tag{5.1}$$

If our planet absorbs the matter of the absolute space of the Universe into its limits, then in Figure 10 the events unfold as follows. While the light signal sent from the Newtonian apple travels from point $\boldsymbol{O}$ to point $\boldsymbol{A}$ (a distance equal to an inverse second), point $\boldsymbol{A}$ itself will move to point $\boldsymbol{A_1}$ at a speed of ***9,8 m/sec***. And not only point $\boldsymbol{A}$ will move to point $\boldsymbol{A_1}$, but the entire circle, described along the front of propagation of light waves by a dotted line, will take the place of the circle drawn in figure 10 by a continuous line. As a result, it will be discovered that in spite of the apparent state of rest of the control apple relative to the Earth surface, the physical system "Newtonian apple — personal continuum" has exactly the same appearance as if the control apple was moving in its own **PS-TC** with a uniform speed of ***9,8 m/sec***. Or, which is the same thing, it is uniformly accelerated relative to Earth's personal space-time with a characteristic of ***9,8 m/sec***^{2}.

Thus, the classical cosmonaut, standing with an apple in his hand on the roof of a high-rise house, concludes that, while maintaining the state of rest of the control apple relative to the Earth's surface, the unified physical system "Newtonian apple — personal continuum" experiences all signs of uniform acceleration. This means that the classical cosmonaut consistently arrives at the general equivalence principle proclaiming absolute equivalence of inertial and gravitational mass. According to this general principle, the observer is unable to distinguish the constant acceleration of a test body, in the absence of gravitational fields, from the resting state of the same body in an intense gravitational field.

To this we can add that the classical cosmonaut retains a peculiar choice. In accordance with his will, he has an opportunity to find the acceleration of the physical system "Newtonian apple — personal continuum", staying visually at rest relative to the Earth, from the position of the terrestrial **PS-TC**. In this case, he will obtain the sought solution using the famous Newtonian equality:

$$g = \gamma \frac{M}{R^2} \tag{5.2}$$

The solution of the Newtonian equation **(5.2)** gives the dimensionality m/sec^2. And this is a perfectly valid dimensionality as applied to Earth's personal space-time.

If a classical cosmonaut wishes to calculate the acceleration of the physical system "Newtonian apple — personal continuum", visually at rest relative to the Earth, from the position of personal space-time of the apple itself, he will have to use equality **(5.1)**.

The solution of this equality gives the dimensionality m/sec. And this dimensionality is unconditionally valid with respect to the proper personal space-time of the control apple.

From the physical point of view both equations **(5.1)** and **(5.2)** are absolutely identical. Exactly so are identical, as it was said in connection with the fundamental symmetry between the acceleration of the test body in the accepted **PS-TC** and its uniform motion in the proper personal space-time.

The main conclusion that a classical cosmonaut standing with a Newtonian apple in his hand on the roof of a high-rise building should make for himself can be succinctly formulated as follows:

Due to the fact that the planet Earth absorbs the matter of absolute space of the Universe into its limits with a speed of ***9,8 m/sec***, the control apple located in the Earth's **PS-TC**, though it preserves the state of rest relative to the Earth, but the unified physical system "Newtonian apple — personal continuum" is exposed to such an effect, as if the apple is reported with a uniform acceleration with a characteristic ***9,8 m/sec***^{2}.

Violation of the equilibrium state of the physical system "control apple — personal continuum" leads to the fact that a classical cosmonaut standing on the roof of a multistory building experiences the pressure of the apple mass in the direction of the Earth's center. The pressure force of the apple in the cosmonaut's hand is an expression of the aspiration of the physical system "material object — personal continuum" to an equilibrium state. As soon as a cosmonaut standing on the roof of a high-rise building releases an experimental apple from his hand, the physical system "material object — personal continuum" will immediately have an opportunity to enter an equilibrium state. When the geometrical center of the circle circumscribed along the light wave propagation front in the personal space-time of the test apple and the center of its mass will coincide at the same point. This can happen only as a result of uniform acceleration of the Newtonian apple relative to the Earth's mass, with a speed of ***9,8 m/sec***^{2}.

Indeed, when the apple was in the cosmonaut's hand, i.e. in the state of rest relative to the Earth, the physical system "Newtonian apple — personal continuum" experienced acceleration. Now, as a result of acceleration of the control apple relative to the Earth, the physical system "Newtonian apple — personal continuum" returns to an equilibrium, balanced state.

If we summarize our theoretical reasoning and try to trace a logical series reflecting the order of realization of the mechanism of universal gravitation, we can come to the following generalization.

Newtonian mechanics represented universal gravitation as a result of gravitational interaction between two masses of matter with the help of mysterious forces of instantaneous long-range action.

In this mechanics there were two physically attributable operators in the form of two masses of matter. The theory of relativity has radically changed the situation. Gravitational interaction in Einstein's presentation was realized according to a much more complex scheme. According to the theory of relativity, the gravitational mass emits a gravitational field, which gives the test body an acceleration. That is, the test body does not react to the radiating mass, as it seemed to Newton, but to the gravitational field. As you can see, the theory of relativity involves three attributable operators — two masses of matter and the gravitational field. And the decisive interaction in Einstein's presentation unfolds in the interactions between the gravitational field and the test body. By direct analogy with the Maxwellian electromagnetic theory, built on the interaction of the electromagnetic field with the electromagnetic charge.

In our theoretical construction world gravitation is realized according to an even more complex scheme. In our theoretical construction the radiating universal gravitation mass forms its own personal space-time. The latter, in turn, affects the metric structure of the personal continuum of the test body. And the trial body's own personal space-time continuum forces the controlling mass to experience universal gravitation. Thus, four attributable physical operators appear and participate in the gravitational interaction. And the decisive events, according to our version, unfold just in the interaction between the personal continua of the two gravitational masses.

6. CONCLUSION

We would like to conclude this book by reflecting on the nature of gravitational waves.

We understand that the mathematical apparatus of the theory of relativity is completely borrowed from Maxwell's electromagnetic theory. In this connection, it seemed to the author of the theory of relativity the most natural to consider the physical facts of gravitational fields by analogy with electromagnetic fields. However, the results of experiments with the Foucault pendulum completely exclude the possibility of such a direct analogy. If the physical facture of the gravitational field corresponded to the electromagnetic field, then the force flows of the Earth's gravitational field rotated together with the Earth's mass. In fact, nothing of the kind is observed, and this is directly evidenced by the behavior of the Foucault pendulum.

The fundamental difference between the gravitational and electromagnetic fields, first of all, consists in the topology of expansion of the force lines of these fields. The expansion vector of force lines of the terrestrial gravitational field is strictly oriented to the center of mass of our planet. This is connected with displacement of the mother matter of space towards the Earth's center, as a result of which the Earth's **PS-TC** arises. The Foucault pendulum is known to swing at right angles to the force lines of the Earth's gravitational field vector. The results of experiments testify that the pendulum is completely free from the influence of this field in the direction perpendicular to the vector of its force lines, — in other words, to the vector of the gravitational field expansion. It follows that the Earth's gravitational field is not isotropic at all and its influence extends only in one direction.

We are also well aware that the expansion of the electromagnetic field field lines is carried out in many directions. That is, the geometry of electromagnetic field expansion has a completely different, multidirectional character. In fact, we are obliged to take such a field as isotropic, as opposed to gravitational field. Therefore, a direct analogy between the electromagnetic and gravitational fields seems to be questionable. The symmetric mathematical apparatus designed to describe these fields must be considered just as doubtful.

In all modern experiments on the detection and registration of gravitational waves there is one fundamental mistake. All experimentalists proceed from the assumption that the nature of gravitational fields is completely similar to the nature of electromagnetic fields, which directly follows from the equations of the theory of relativity. It is assumed that detectors installed on the Earth's surface are able to register the presence of gravitational waves. And this could actually be the case, if the nature of these waves was similar to electromagnetic waves. Experiments have been put in place for a long time, but, as we know, to no avail.

In order for experiments on registration of gravitational waves to have a positive result, we must fundamentally reconsider our idea of these waves and completely reconsider the very procedure of conducting experiments. First of all, we must proceed from the fact that gravitational waves are standing waves. The movement of the matter of space toward the center of the Earth occurs, in the geometrical sense, on a wave trajectory. In a straight line, the mother matter moves only in one spatial metric dimension. However, we must keep in mind that in this case there is a wave perturbation of spatial matter into the temporal metric dimension. Thus, in general topological terms, gravitational waves have a kind of springs.

In order to register such waves it is necessary to look a little bit back into the past and go back to the experiments of Galileo's grandfather. We should not, of course, climb the Leaning Tower of Pisa. But the detectors for registering gravitational waves will need to be taken outside the Earth. Release them in free fall, and they will surely reveal the presence of standing gravitational waves.

A few more words. Very soon mankind will learn to use the gravitational telescope and a completely different, magnificent picture of the Universe will be revealed before us. By the way, modern scientific and technical means are enough to construct effectively working gravitational telescope. In any case, for the author of this book the solution of such a problem is not very difficult.

2023

Boris Dmitriev

WHAT IS MOTION

Time worries – one, time worries – two!

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